1917–1918.

(Thirteenth Year of the Meteorological Committee.)

SEVENTY-EIGHTH MEETING.

South Kensington, S.W.7, 23rd May, 1917.

PRESENT :

MAJOR LYONS, IN THE CHAIR.

CAPTAIN HARVEY. | THE HYDROGRAPHER.

DR. SCHUSTER.

The Director was prevented by illness from attending.

634. The Minutes (627–633) of the last Meeting (28th March, 1917) previously circulated, were taken as read and confirmed.

635. CORRESPONDENCE.—**Committee for the Investigation of Atmospheric Pollution.** —Reported—that the resolutions of the Meteorological Committee, printed in Minute 629, were communicated to the Department of Scientific and Industrial Research on 29th March, and that a warrant for £500, being the grant referred to in condition 3 of the enclosure to the letter of the Department dated 12th March, had been received on 2nd April.

War Office.—*Postal Censor.*—Reported—correspondence (5416/C.11 F) with the Chief Postal Censor with regard to the transmission of meteorological publications from this country to addresses abroad. At the request of the Admiralty all such issues had been suspended at the end of 1916 with the exception of Meteorological Office publications to addresses in allied countries only. The arrangement arrived at is the following :—

ARRANGEMENTS WITH THE CHIEF POSTAL CENSOR RESPECTING THE DESPATCH OVERSEAS OF METEOROLOGICAL PUBLICATIONS (extracted from Letters 5407, 5454 in File C.11/F).

(*a*) METEOROLOGICAL OFFICE.

Allied Countries.

Despatch as at present.

Neutral Countries.

The copies of meteorological publications which it is desired to despatch are to be sent, enveloped and addressed as usual, under cover to the appropriate one of the undermentioned addresses :—

Letter or Printed Papers Post :

The Chief Postal Censor,
Room 10,
Strand House,
Carey Street,
London, W.C.2.

Parcel Post :

The Censor of Printed Matter,
Postal Censorship Parcels Branch,
Gloucester Gate,
Regent's Park, N.W.1.

The outer cover addressed to the Censor need not be stamped, but the packets to be sent abroad should be stamped in the usual way, and in the case of parcels the necessary Despatch Notes and Customs declarations should accompany them.

A certificate of the Director of the Meteorological Office to the effect that the publications in question contain no information of value to the enemy is to be sent with them to the Censor.

(*b*) Other Meteorological Institutions.

1. A copy of each publication which it is desired to send abroad to be submitted to the Director of the Meteorological Office, who will, wherever applicable, issue a certificate that the publications in question contain no information of value to the enemy.	1. Same as for Allied Countries.
2. Copies of publications so certified may then be despatched direct by post in the usual way. No certificate need be sent to the Postal Censor.	2. Same as for Meteorological Office publications for despatch to Neutral Countries.

Meteorological Office,
London, S.W.7.,
21st May, 1917.

Reconstruction Committee.—Reported—that it had been announced in the Daily Press that a Sub-Committee of the Prime Minister's Reconstruction Committee under the chairmanship of Lord Balfour of Burleigh, had been appointed to consider the desirability of adopting the metric system of weights and measures, and that a letter had been addressed to Lord Balfour pointing out that the Meteorological Office is closely interested in the subject, and that the experience of the Office would be placed at the disposal of the Committee if desired. The Director had subsequently had an interview with Lord Balfour, who had asked him to prepare and submit a memorandum on the subject.

Air Board.—*Lord Northcliffe's Committee.*—Read—letter 1360/A.03 of 18th May from the Secretary of the Air Board stating that a Committee was in process of formation to enquire into aerial civil communications after the War, and that it was desired that a representative of the Meteorological Office should be appointed to serve on the Committee, of which Lord Northcliffe was to be chairman. In an informal covering letter, Sir H. P. Harvey stated that the name of Major Taylor had been suggested to the Air Board.

Reported further—that in the "Times" of May 23rd there appeared a list of the members of the Committee who had up to then been appointed. The Committee was to be called "The Civil Aerial Transport Committee."

It was agreed to nominate the Director as the representative of the Office.

Foreign Office Committee.—*Sir Louis Mallet.*—Reported—that the Director had made enquiries of Mr. Barstow with regard to the provision for dealing with the meteorology of conquered territories, and that he had been referred to Sir Louis Mallet, of the Foreign Office who was stated to be dealing with the questions which will come up for settlement at the Peace Congress.

Major Lyons had accordingly written to Sir Louis Mallet, who had replied that the matter did not come within the scope of his Territorial Committee, and that he is making enquiry of Captain Amery, M.P.

636. Twelfth Annual Report.—Reported—that a portion of the Report had been prepared but that none of it was yet in type.

637. Accounts for 1916–1917.—Submitted—The following statement of the accounts for the financial year ending 31st March, 1917 :—

Submitted—The following Statement of Accounts for the twelve months ended 31st March, 1917, prepared for audit by the Comptroller and Auditor-General:—

Receipts.

1915-16. £ s. d.		£ s. d.	1916-17. £ s. d.
861 16 6	Balance from year 1915–16	—	2,208 15 5
22,500 0 0	Parliamentary vote..	—	22,500 0 0
	DEPARTMENTAL EXPENSES REPAID:		
4 17 5	Forecasts, &c. ...	2 9 0	
101 10 0	Marine, Statistical, and Administrative	71 7 5	
163 9 10	Instruments ...	226 16 1	
			300 12 6
	INCIDENTAL EXPENSES REPAID:		
126 14 0	D.W. Report ...	285 5 2	
50 18 5	Divisional... ...	89 2 6	
6 4 1	Advertising Account	7 12 10	
			382 0 6
70 1 5	STATIONERY OFFICE	—	64 2 9
178 6 7	TELEGRAPH CHARGES REPAID	—	657 2 7
8 12 0	TELEPHONE CHARGES REPAID	—	1 7 8
168 0 0	INSPECTIONS ...	—	148 0 0
	INSTRUMENTS:		
2,687 8 9	Royal Navy ...	4,750 14 2	
1,345 11 5	Mercantile Marine, Stations, &c. ...	4,161 19 6	
			8,912 13 8
	SUPERANNUATION ACCOUNT:		
745 12 8	Annuities	573 15 0	
16 10 1	Interest on Investments	32 5 6	
			606 0 6
	*OBSERVATORIES, BRANCHES, AND STATIONS:		
608 13 10	Kew	727 19 8	
1,019 9 6	Eskdale	1,021 2 7	
34 3 8	Valencia	31 8 5	
273 10 9	Farnborough ...	294 1 3	
9 6 4	Falmouth... ...	13 1 2	
12 0 0	Benson ...	10 0 0	
—	Edinburgh ...	—	
134 5 11	Miscellaneous ...	91 9 7	
			2,189 2 8
	LECTURES AND EXPERIMENTS ...	—	—
£31,136 7 11			£37,969 18 3

Payments.

1915-16. £ s. d.		£ s. d.	1916-17. £ s. d.
1,000 0 0	Director...	—	1,000 0 0
	OFFICE SALARIES (including Insurance):		
9,152 19 5	Monthly	9,355 17 1	
1,292 9 1	Weekly	1,682 4 11	
			11,038 2 0
	EXPENSES OF OFFICE:		
685 3 3	Rent, Heating, and Lighting	688 8 11	
229 11 11	Furniture and Equipment	122 16 0	
21 4 10	Library	25 3 7	
331 11 11	Insurances and Repairs Incidental Expenses, and Consumable Stores	73 5 11 258 10 3	
17 14 2	Advertising Account ..	7 10 0	
			1,175 14 8
	POST OFFICE:		
665 3 3	Postage	754 6 8	
87 15 10	Telephones	92 8 6	
1,879 12 7	Telegrams	3,177 14 4	
			4,024 9 6
88 17 5	STATIONERY OFFICE ..	—	70 1 5
143 19 5	TRAVELLING EXPENSES	—	203 3 1
	SUPERANNUATION:		
425 0 0	Pensions not chargeable on Fund ...	111 13 4	
263 12 10	Pensions chargeable on Fund	275 12 0	
697 10 0	Annuities	562 10 0	
665 1 6	Contribution to fund	237 10 0	
			1,187 5 4
	COST OF INSTRUMENTS:		
2,684 8 9	Royal Navy	4,743 13 2	
171 5 0	For Office use ...	330 11 8	
1,675 6 8	Other Commissions ...	4,727 16 0	
			9,802 0 10
	*OBSERVATORIES, BRANCHES, AND STATIONS:		
2,023 4 1	Kew	2,134 2 2	
1,418 2 3	Eskdale	1,693 19 3	
637 5 9	Valencia	693 18 1	
403 2 10	Farnborough	520 12 3	
190 13 0	Falmouth	262 3 11	
389 13 1	Benson	480 7 6	
372 16 0	Edinburgh	373 13 0	
1,314 7 8	Miscellaneous ...	1,360 7 10	
			7,519 4 0
			36,020 0 10
	†LESS WAR LOAN SUBSCRIPTIONS ...	—	97 16 0
			35,922 4 10
	BALANCE:		
2,131 0 4	Cash at Bank... ...	1,964 6 4	
77 15 1	,, at Office ...	83 7 1	
			2,047 13 5
£31,136 7 11			£37,969 18 3

* For details, *see* separate statement.

† Deductions from Salaries during March; lodged with Bank on April 9th.

Statement of Assets and Liabilities at 31st March, 1917.

Liabilities.

£ s. d.		£ s. d.
2,149 13 5	To sundry creditors	3,674 13 10
5 18 6	,, superannuation	2 8 6
2,322 11 8	,, balance	2,336 10 0
£4,478 3 7		£6,013 12 4

Assets.

£ s. d.		£ s. d.
2,208 15 5	By cash at Bank and at Office ...	2,047 13 5
36 8 2	,, salaries reserved (premiums) ...	36 8 2
444 1 2	,, M.O. instruments in stock	717 1 7
904 15 8	,, sundry debtors	1,753 3 9
884 3 2	,, Admiralty	1,459 5 5
£4,478 3 7		£6,013 12 4

NOTE.—On 31st March the amount of Government securities held for the provision of Superannuation Annuities was £26 14*s.* 2*d.* 2½ per cent. Consols, and £989 9*s.* 6*d.* 5 per cent. War Loan.

Observatories.—Statement of Accounts for the twelve months ended 31st March, 1917.

Kew.

1915–16.	*Receipts.*		1916–17.		1915–16.	*Payments.*			1916–17.	
£ s. d.			£ s. d.		£ s. d.		£ s. d.		£ s. d.	
164 0 0	Subvention, Scott Antarctic Fund	164 0 0			1,657 10 3	Salaries, Scheduled...	1,696 4 1			
387 17 7	Gassiot Trust	497 2 9			28 2 0	Sunday and holiday duty	37 5 3			
			661 2 9						1,733 9 4	
4 12 11	Expenses refunded locally ...		50 9 7		26 11 0	Cost of forms, &c.			52 13 9	
30 11 6	Tests and Commissions		3 3 7		73 15 11	Rent, Rates, Taxes, Repairs and Insurance			82 2 4	
21 11 10	Cost of books and forms refunded		13 3 9		107 14 5	Fuel and lighting			101 15 7	
1,414 10 3	Balance		1,406 2 6		57 18 1	Equipment and instruments ...			57 13 7	
					18 5 3	Consumable stores			52 16 4	
					15 9 8	Incidental expenses			20 15 8	
					4 13 8	Books, &c.			5 9 8	
					30 18 6	Postage, telephones and telegrams			25 13 11	
					2 5 4	Travelling expenses			1 12 0	
£2,023 4 1			£2,134 2 2		£2,023 4 1				£2,134 2 2	

Eskdale.

£ s. d.		£ s. d.		£ s. d.		£ s. d.
1,000 0 0	Subvention, Royal Society ...	1,000 0 0	924 13 11	Salaries, Scheduled		983 17 0
19 9 6	Expenses refunded locally ...	21 2 7	72 9 3	Cost of forms, &c		66 2 3
398 12 9	Balance	672 16 8	50 12 5	Rent, Rates, Taxes, Repairs and Insurance		14 4 9
			151 19 0	Fuel and lighting		197 0 10
			43 7 11	Equipment and instruments ...		38 8 4
			68 19 4	Consumable stores...		37 15 11
			17 12 5	Incidental expenses		8 16 5
			9 9 2	Books, &c.		11 14 11
			37 19 0	Postage, telephones and telegrams		38 18 11
			40 19 10	Travelling and motor car expenses		296 19 11
£1,418 2 3		£1,693 19 3	£1,418 2 3			£1,693 19 3

Valencia.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
11 1 2	Subventions (Rosse Fund) ...	9 19 5	490 17 11	Salaries, Scheduled	520 2 2
23 2 6	Expenses refunded locally ...	21 9 0	4 2 0	Cost of forms	4 19 11
603 2 1	Balance	662 9 8	84 10 5	Rent, Rates, Taxes, Repairs and Insurance	54 7 11
			18 3 0	Fuel and lighting	19 5 5
			16 2 3	Equipment and instruments ...	69 5 0
			5 17 2	Consumable stores	8 9 5
			18 9	Incidental expenses	1 12 2
			1 0 4	Books, &c.	1 8 0
			14 0 6	Postage, telephones and telegrams	14 8 1
			1 13 5	Travelling expenses	—
£637 5 9		£693 18 1	£637 5 9		£693 18 1

Farnborough Branch Office.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
250 0 0	Subvention (Advisory Committee for Aeronautics)	250 0 0	221 17 6	Salaries, Scheduled	49 12 6
23 10 9	Expenses refunded (War Office) ...	44 1 3	1 8	Overtime, &c.	—
129 12 1	Balance	226 11 0	—	Cost of Forms	—
			7 9	Rent, Rates, Taxes, Repairs and Insurance	—
			—	Fuel and Lighting	4 5
			13 18 8	Equipment and instruments ...	368 17 1
			17 4 9	Consumable stores	24 1 10
			3 2	Incidental expenses	3 16 4
			2 15 0	Books, &c.	1 8 0
			103 13 5	Postage, telephones and telegrams	72 0 5
			43 0 11	Travelling and motor car expenses	11 8
£403 2 10		£520 12 3	£403 2 10		£520 12 3

Falmouth Weather Station.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
9 6 4	Expenses refunded locally ...	13 1 2	30 0 0	R. Cornwall Polytechnic Society...	30 0 0
181 6 8	Balance	249 2 9	96 12 6	Salaries, Scheduled	127 9 0
			2 6	,, Additional	—
			14 6	Rent, Rates, Taxes, Repairs and Insurance	34 2 11
			13 0 2	Equipment and instruments ...	1 7 2
			3 7 10	Consumable stores	1 0 11
			17 1	Incidental expenses	17 11
			31 16 2	Postage, telephones and telegrams	59 7 9
			14 2 3	Travelling expenses	7 18 3
£190 13 0		£262 3 11	£190 13 0		£262 3 11

BENSON.

1915–16. Receipts. £ s. d.		1916–17. £ s. d.	1915–16. Payments. £ s. d.		1916–17. £ s. d.
12 0 0	Expenses refunded locally ...	10 0 0	344 12 9	Salaries, Scheduled	358 18 8
377 13 1	Balance	470 7 6	1 0 6	Overtime, &c.	12 0
			—	Cost of forms, &c.	—
			2 0 0	Rent, Rates, Taxes, Repairs and Insurance	—
			1 8 10	Fuel and Lighting	1 10 0
			3 13 2	Equipment and instruments ...	81 15 1
			25 15 2	Consumable stores	16 18 6
			3 1 5	Incidental expenses	2 17 0
			—	Books, &c.	1 11 6
			8 4 3	Postage, telephones and telegrams	14 3 9
			—	Travelling expenses	2 1 0
£389 13 1		£480 7 6	£389 13 1		£480 7 6

METEOROLOGICAL OFFICE, EDINBURGH.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
372 16 0	Balance	373 13 0	350 0 0	Subvention	350 0 0
			22 16 0	Travelling expenses	23 13 0
£372 16 0		£373 13 0	£372 16 0		£373 13 0

MISCELLANEOUS STATIONS.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
134 5 11	Cost of forms refunded	91 9 7	344 10 0	Subventions, Aberdeen, Armagh 344 10 0	
1,180 1 9	Balance	1,268 18 3	55 0 0	British Rainfall Organisation ... 55 0 0	
					399 10 0
			699 6 1	Salaries of Observers (36)	738 11 6
			6 0	Overtime, &c.	—
			118 12 0	Cost of forms, &c.	133 12 6
			11 13 8	Rent, Rates, Taxes, Repairs and Insurance	6 9 0
			1 13 3	Equipment and instruments ...	10 15 10
			18 2	Consumable stores	19 6
			51 13 4	Agents' fees, &c.	34 15 2
			7 5 0	Books, &c.	5 9 6
			28 10 2	Postage, telephones and telegrams	30 4 10
£1,314 7 8		£1,360 7 10	£1,314 7 8		£1,360 7 10

METEOROLOGICAL FIELD SERVICE.

FRANCE.

£ s. d.		£ s. d.	£ s. d.		£ s. d.	£ s. d.
344 3 8	War Office	167 6 11	160 14 0	Salaries : Major E. Gold	35 18 8	
437 7 2	Balance	276 17 7	56 2 6	Capt. A. E. M. Geddes ...	—	
			40 15 6	Capt. A. H. R. Goldie ...	15 9 8	
			—	Lieut. E. H. Chapman ...	—	
			24 17 0	Lieut. C. D. Stewart ...	—	
			7 6 10	Lieut. F. Entwistle ...	—	
			29 15 5	Lieut. J. C. Lamb ...	—	
			1 4 2	Lieut. J. W. Bispham ...	—	
			16 9 5	Sergt. R. Pyser	38 11 10	
			1 3 0	Corpl. E. L. Clinch ...	43 10 0	
			—	Corpl. A. G. Goad ...	63 12 10	
					197 3 0	
			—	Cr.—Amounts refunded	116 15 6	
						80 7 6
			5 19 8	Salaries : Overtime ...	—	
				Incidental Expenses :		
			9 5 8	Postage	24 4 10	
			—	Telegrams	—	
			2 4 11	Printed books ...	—	
			12 3 6	Miscellaneous... ...	15 4	
						25 0 2
			413 9 3	Instruments		338 16 10
£781 10 10		£444 4 6	£781 10 10			£444 4 6

DARDANELLES.

£ s. d.		£ s. d.	£ s. d.		£ s. d.	£ s. d.
129 1 5	Admiralty	352 8 4	15 12 6	Salaries : Capt. E. M. Wedderburn	—	
—	War Office	760 10 10	13 15 0	Lieut. E. Kidson ..	—	
303 2 6	Balance	789 6 2	—	Corpl. C. V. Ockenden	19 5 8	
						19 5 8
			41 5 2	Salaries : Overtime ...	—	19 10 6
				Incidental Expenses :		
			1 3 0	Postage	13 13 2	
			162 3 7	Telegrams	1,297 9 9	
			—	Printed books ...	—	
			9 9 0	Typewriter	—	
			3 15 3	Miscellaneous ...	1 11 8	
						1,312 14 7
			185 0 5	Instruments		550 14 7
£432 3 11		£1,902 5 4	£432 3 11			£1,902 5 4

Comparison of Expenditure and Receipts (as above) with the Estimates of Minute 560.—Submitted—the following statement of expenditure and receipts for the year 1916–17 in comparison with the Estimates of Minute 560 :—

	Service.	Voted 1916–17.	Spent 1916–17.	Excess.	Defect.	Proposed 1917–18.	
		£	£	£	£	£	£
1.	**Salaries :**						
	Office	12,259	—	—	—	13,603	
	Observatories	4,426	—	—	—	4,079	
	Insurance	45	—	—	—	45	
	Meteorological Field Service	1,958	—	—	—	1,670	
		18,688				19,397	
	Less Army Pay and deductions on account of members of the Staff on War Service ...	3,224				2,543	
							16,854
		15,464	15,812	348	—		
	Office Expenses :						
2.	Rent, Heating, and Lighting	700	688	—	12	700	
3.	Furniture and equipment	100	123	23	—	100	
4.	Library	50	25	—	25	50	
5.	Insurances and Repairs	120	73	—	47	120	
6.	Incidental Expenses and Consumable Stores	250	259	9	—	250	
7.	Advertising Account	20	8	—	12	20	
							1,240
8.	**Stationery Office** (S.O.P.)	60	70	10	—	—	100
	Post Office Charges :						
9.	Postage	750	754	4	—	—	750
10.	Telephones	100	92	—	8	—	100
11.	Telegrams from inland stations	1,000	1,239	239	—	900	
12.	„ wireless messages	10	—	—	10	—	
13.	„ from abroad	525	1,286	761	—	1,455	
14.	„ sent abroad	30	475	445	—	—	
15.	„ Gale Warnings	109	22	—	87	—	
16.	„ Harvest Forecasts	50	17	—	33	50	
17.	„ sundry messages, &c.	60	29	—	31	60	
18.	Allowances to Clerks	220	110	—	110	200	
							2,665
19.	**Travelling Expenses**	250	203	—	47	—	200
	Superannuation :						
20.	Pensions not chargeable on Fund	425	112	—	313	25	
21.	„ chargeable on Fund	516	276	—	240	276	
22.	Annuities	712	562	—	150	562	
23.	Contribution to Fund	234	237	3	—	474	
							1,337
	Purchase of Instruments :						
24.	Royal Navy	1,000	4,744	3,744*	—	4,000	
25.	For Office use	450	331	—	119	300	
	Other commissions	1,000	4,727	3,727*	—	4,000	
							8,300
	M.O. Observatories (excluding salaries) :						
26.	Kew	422	401	—	21	422	
27.	Eskdale	510	710	200	—	520	
28.	Valencia	225	174	—	51	168	
29.	Farnborough	250	471	221	—	205	
30.	Falmouth	173	135	—	38	170	
31.	Benson	488	121	—	367	178	
32.	Edinburgh Office	375	374	—	1	375	
							2,038
	Auxiliary Observatories and Stations :						
33.	Subventions : Aberdeen	295	295	—	—	295	
34.	Armagh	50	50	—	—	50	
35.	British Rainfall Organization	55	55	—	—	55	
							400
36.	Salaries of Observers : Anemograph stations	670	25	23	—	670	
	Telegraphic stations		668				
	Climatological stations.	50	45	—	5	100	
							770
37.	Incidental Expenses : Rents, Rates, Taxes, etc.	15	7	—	8	10	
38.	Cost of Forms, &c. ...	160	145	—	15	150	
39.	Agents' Fees	90	35	—	55	60	
40.	Labels	10	5	—	5	10	
41.	Postage, telephones, and telegrams.	30	30	—	—	50	
							280
	Total	28,073	36,020	7,947	—	—	35,034

* Recoverable.

APPROPRIATIONS IN AID.

	Voted 1916-17.	Realized. 1916-17.	Excess.	Defect.	Proposed 1917-18.	
Office Expenses Refunded:	£	£	£	£	£	£
42. Departmental: Administration, &c. ...	100	71	—	29	60	
43. Forecasts	—	3	3	—	5	
44. Instruments	150	227	77	—	150	
						215
45. Incidental: Administration, &c.	40	53	13	—	80	
46. Forecasts and Daily Weather Report.	100	285	185	—	80	
47. Instruments	25	36	11	—	10	
48. Advertising Account	10	8	—	2	20	
						190
49. **Stationery Office** (Sale of Publications) ...	60	64	4	—	—	100
50. **Telegraphic Expenses Refunded:** Home	30	22	627	—	50	
Foreign		635		—	1,100	
						1,150
51. **Telephone Charges Refunded**	—	1	1	—	—	2
52. **Inspections**	100	148	48	—	—	100
53. **Instruments:** Royal Navy	1,000	4,751	3,751	—	4,000	
54. Other sources	1,000	4,162	3,162	—	4,000	
						8,000
55. **Superannuation:** Interest on Fund ...	30	32	2	—	30	
56. Annuities	712	574	—	138	562	
						592
Lectures and Experiments:						
57. Schuster Readership	—	—	—	—	—	—
58. Other sources	—	—	—	—	—	—
Observatories:						
59. Kew	709	728	19	—	631	
60. Eskdale	1,096	1,021	—	75	1,096	
61. Valencia	30	31	1	—	28	
62. Farnborough	271	294	23	—	315	
63. Falmouth	10	13	3	—	15	
64. Benson	—	10	10	—	—	
						2,085
65. **Auxiliary Observatories and Stations** (Cost of Forms)	100	92	—	8	—	100
Total	5,573	13,261	7,688	—	—	12,534

NOTES ACCOMPANYING COMPARISON OF ESTIMATES WITH EXPENDITURE.

1. Increase mainly due to increase of Staff and payments of War Bonus.
3. Purchase of new Milners' Safe=£25.
11. Due to increased cost of telegrams and additional payments for 1 a.m. Reports.
12. Reports by wireless stopped during War.
13. 14. Mainly recoverable; Increase due to telegrams in connection with Meteorological Section R.E. See Appropriations, No. 50.
15. Gale warnings discontinued.
18. Due to cessation of payments at certain stations during operation of Summer Time Act, and reduction of charge for special attendance at South Kensington Post Office.
19. Inspection work curtailed.
20. Defect due to decease of Dr. R. H. Scott.
21. Estimate included provision for Mr. W. Allingham and Mr. W. G. James (£240). See Minute 630.
22. Deficit due to deduction of Income Tax. See Appropriations, No. 56.
24. See Appropriations, No. 53.
25. See Appropriations, No. 54.
27. Purchase of new Motor Car=£216.
29. Cost of new Bungalow=£305.
31. Expenses less than Estimate; Equipment £18; Consumable Stores £43; Reserve £300—Total £361.
36. Additional payment for 1 a.m. observations.
44, 47. Commission on increased recoverable requisitions.
46. Includes payment by Admiralty of £181 for postage of D.W. Report to March, 1916.
50. See Nos. 13, 14 above.
53. See No. 24 above.
54. „ „ 25 „
56. „ „ 22 „
60. Rent of Rooms (£76) not shown in accounts.

The items of expenditure which are shown in excess of the estimate were approved.

Audit of Stock of Instruments 2nd April.—Reported—that Major Lyons had audited and certified on 2nd April, 1917, the stock of instruments for stations, for sale and for the Mercantile Marine at 31st March, 1917 (1296/400).

The Director of Stores, Admiralty, had similarly audited and certified on 2nd April the stock of Admiralty instruments at 31st March, 1917.

As the Stock Books do not include all the instruments which are the property of the Committee, it is proposed to compile a fresh Stock Ledger and to include in it a complete statement of the property of the Meteorological Committee.

Approved

638. Office Staff.—**War Bonus.**—Reported—that the Conciliation and Arbitration Board for Government Employees had issued an award granting a further War Bonus to permanent civil servants, and that the Treasury had approved the award.

The new scale of War Bonus is as follows :—

	Men. Weekly bonus.	Women. Weekly bonus.
Pay of 30*s.* a week or less...	9*s.* (previously 4*s.*)	6*s.* (previously 2*s.*)
Pay between 30*s.* and 40*s.* a week ...	8*s.* (previously 4*s.*)	5*s.* (previously 2*s.*)
Pay between 40*s.* and 60*s.* a week ...	7*s.* (previously 3*s.*)	4*s.* 6*d.* (previously 1*s.* 6*d.*)
Pay between 60*s.* a week and £250 a year	5*s.* (nothing previously)	3*s.* 6*d.* (nothing previously)

War Bonus is at present being paid to 50 persons. Under the new arrangement it would be paid to 81 persons. The extra cost involved is estimated to be £604 10*s.* per annum.

It was agreed that this new scale should be adopted in the Office in place of the present scheme for War Bonus (Minute 606) and that the increase should date back to 1st January, 1917, as in the case of civil servants.

It was further agreed to inform the Treasury of this decision of the Committee.

J. S. Dines.—Read—letter 1211/DW.16 of 30th April from Mr. J. S. Dines, Senior Professional Assistant in the Forecast Division, asking for an increase in salary (which now stands at £300, the maximum allowed by the regulations) on the ground that his present work involves considerably greater responsibility than in the past, that the supervision of the night work since its commencement has devolved entirely upon himself with Mr. Lempfert, and that the cost of living in South Kensington is considerably greater than at Farnborough.

It was agreed that the maximum salary of the Senior Professional Assistant in the Forecast Division should be increased from £300 to £350 by annual increments of £20, the first to date from 1st April, 1917, in the case of Mr. J. S. Dines.

Private A. A. Lovie.—Reported—letter 5423/C.11 (I), dated 5th April, from Private A. A. Lovie with reference to the Civil Pay now being made to him, asking whether the annual increments which he would have received had he remained at the Office could be taken into consideration in computing the Civil Pay.

It was agreed that these increments be allowed in accordance with Minute 615 and that a payment of £22 10*s.* should accordingly be made to his nominee, being the increments which in normal times he would have received in 1915, 1916, and 1917.

Commissionaire.—Reported—that Sergeant Chillman, of the Corps of Commissionaires, who had recently been appointed Office-Keeper in place of A. Woolley, resigned (Minute 630), had requested that he be allowed to wear the Office Uniform instead of that of the Corps of Commissionaires in order that he might claim from the Corps the value of the uniform which would not then be required.

Reported—that Office Uniforms are provided without any deduction from salary.

It was agreed to take no action in the matter.

Miss Cottrill.—Reported—Order 584 appointing Miss E. F. Cottrill, Telephone Clerk, at 35*s.* a week including War Bonus. Her duties will commence on Tuesday, 29th May, and the appointment will be subject to one week's notice on either side. It is proposed to transfer Miss Herbert, now Telephone Clerk, to the Instruments Division to fill the vacancy caused by the enlistment of the boy clerk.

Approved.

Miss Despicht.—Reported—that A. G. W. Howard, Clerk in the Forecast Division, was suffering from a nervous breakdown and that in consequence provision had to be made for the continuance of his work, which consists partly in decoding and examining telegrams, and partly in drawing the transfers for the Daily Weather Report. As the former duty requires considerable technical skill, which is acquired only after long practice, and as there are now remaining only two other assistants who carry out this work, Miss Despicht has been transferred from the Statistical Division to the Forecast Division in order to draw the transfers.

Re-arrangement of Rooms (Minute 631).—Reported—that Room 15 had been converted into a Store Room for instruments under the care of a Store Keeper, and Room 19 is being arranged for the receipt and despatch of instruments.

639. OBSERVATORIES.—**Gassiot Committee.**—Reported—that a meeting of the Gassiot Committee had been held at the Royal Society's rooms on 9th May and that the following resolutions had been passed :—

Copy of No. 3 of the Minutes of the Gassiot Committee Meeting held on 9th May, 1917.

A report by Dr. C. Chree and Mr. S. Chapman on the Comparison of Magnetograph Records from Greenwich and Kew in connexion with Electric Train disturbances was presented.

After discussion it was—

Resolved—

1. That it is desirable to make provision for an undisturbed magnetic Observatory not necessarily attached permanently to any one locality.
2. That the geographical position of Valentia is favourable for the first location of such an Observatory, which might with advantage be kept going for a period of 10 or 12 years.

The set of instruments, until recently used at Falmouth, is already available for the purpose required, and those at present in use at Kew will ultimately be available also.

It was agreed that the Magnetic Sub-Committee of the Gassiot Committee be asked to report on the provision of huts suitable for temporary magnetic observations.

Eskdalemuir. — *Resignation of Caretaker and Housekeeper.* — Reported — letter 1189/CE11 of 25th April from the Superintendent of Eskdale Observatory reporting that Mr. Stonier, caretaker, and Mrs. Stonier, housekeeper, had resigned their respective appointments. The letter of resignation is dated 20th April, and three months' notice is required, so that the vacancies should be filled before 20th July. The Superintendent is making enquiries for suitable applicants in Scotland to replace them.

Appointment of Girl Clerks.—Reported—that J. B. Beck, boy clerk, will be due to enlist on 5th June, and that the Superintendent had been authorised to arrange for the appointment of two temporary Girl Clerks, Mary A. Kerr and E. M. Anderson, of the George Watson's Ladies' College, Edinburgh, at 23*s.* a week each, plus £13 a year lodging allowance. They have agreed to remain until 1st August, 1918, or three months after the termination of the War, whichever date be earlier, subject to three months' notice on either side.

Civil Pay will be allowed to J. B. Beck while serving with the colours in accordance with the usual practice authorised for men who entered the Office prior to the outbreak of War.

Approved.

Valencia.—*Repair of Tower.*—Reported—that authority had been given to the Superintendent to pay £13 10*s.* for the repair of the tower at Valencia Observatory, and to pay £7 for the provision of a pipe drain to replace a defective stone drain in connexion with the water supply.

Approved.

640. INSTRUMENTS. —**Supplies to the Navy.** — Reported — that in view of the re-organisation of the Instruments Division it would tend to simplify matters if the separate account of Admiralty instruments could be eliminated by treating these instruments on the same footing as other supplies. This would reduce the number of books to be kept by approximately one half. At present the instruments supplied to the Navy are purchased from the makers and paid for periodically by the Admiralty so that the Office is responsible to the Admiralty for the stocks in its possession. Under the proposed system the stocks of instruments for supply to the Navy would be maintained by the Office and claims would be made on the Admiralty periodically for instruments actually supplied. Authority is required for an application to the Admiralty for the change.

Approved.

Unserviceable Stock.—Submitted—a statement of the stock of unserviceable instruments which were not on charge, classified under the following heads:—(*a*) Serviceable or Repairable. (*b*) For Sale. (*c*) Useable as material in workshop. Authority is required for serviceable and repairable instruments to be taken on charge, for the saleable instruments to be sold to makers or by auction, and for the remainder to be transferred to the workshop.

Some of the instruments classed as "Serviceable and Repairable" are of historical interest, and it is proposed to lend them to Museums which desire to exhibit them to the public.

Approved.

Contracts for Ensuing Year.—Reported—that the accounts for the twelve months ended 31st March, 1917, show that the cost of the instruments obtained during the year amounted to £9,802, as against £4,530 in the previous year. The supply is now on such a scale that it would be profitable and convenient to estimate the requirements of standard instruments for the ensuing year, 1st July, 1917, to 30th June, 1918, and to obtain them by contract so that the supply could be distributed over the twelve months.

Approved.

641. Meteorological Section, R.E.—*Increase of Establishment.*—Reported—that the establishment of the Meteorological Section had been increased by six pioneers.

"Mentioned in Despatches."—Reported—that the following members of the Meteorological Section in France had been mentioned in Sir Douglas Haig's despatches, published in the "London Gazette," 18th May :—

Major E. Gold, D.S.O.
Lieut. J. G. Lamb.
Corporal E. L. Clinch.

642. Director's Report and Accounts.—**Daily Weather Report and Supplements.**—Submitted—specimens of special typewritten reports now being prepared daily in the Forecast Division as follows :—

(A) The First Special Weather Report based on the observations at 1 a.m. G.M.T. issued at 8 a.m. Summer Time.

(B) The Second Special Weather Report based on the 7 a.m. observations G.M.T. issued at noon Summer Time.

These comprise a synoptic weather chart and a summary of the weather and forecasts by districts and a further outlook, with a special note on Airship Weather.

The following Supplements to the lithographed Daily Weather Report, which is now printed in the afternoon, are also issued daily :—

1. A Naval Supplement, giving the state of the weather on the Oceans and the outlook.
2. A Supplement containing a summary of weather conditions prevailing on the various fronts together with the outlook.

Weather Map and Glossary.—The third issue of these publications will shortly be exhausted and authority is required for a revision and preparation of the fourth issue.

Approved.

Destruction of Logs (Minute 631).—The decision recorded in Minute 631 regarding the destruction of "good" logs has been modified to the extent that any "good" logs will be kept which contain at least one set of observations of a particular element of sufficient value to be classed as "Very good" at least.

Reports of Work (Minute 611).—Reported—that reports of work of the Office and Observatories for September, 1916, to March, 1917, had been prepared and circulated.

Accounts.—Submitted—The following statement of the Bank Account in the Cash Book :—

	£	s.	d.
Balance on 27th March, 1917	2,809	0	11
Receipts from 27th March to 22nd May, 1917	9,345	6	9
	12,154	7	8
Cheques drawn from 27th March to 22nd May, 1917	6,129	0	5
Balance on 22nd May, 1917	£6,025	7	3

SEVENTY-NINTH MEETING.

South Kensington, S.W.7., 27th June, 1917.

PRESENT:

THE DIRECTOR, IN THE CHAIR.

MR. BARSTOW.	MAJOR LYONS.
THE HYDROGRAPHER.	MR. MIDDLETON.

DR. SCHUSTER.

643. The Minutes (634–642) of the last Meeting (23rd May, 1917), previously circulated, were taken as read, and confirmed.

Reported—Treasury letter 30442/16 of 22nd November, 1916 (3807/C.06) re-appointing Mr. T. H. Middleton, C.B., as the representative of the Board of Agriculture and Fisheries on the Meteorological Committee for a further term of five years from the 2nd December, 1916. (Minute 511.)

644. CORRESPONDENCE.—**Admiralty.**—*Time Zones at Sea.*—The Director reported the receipt from the Admiralty of an invitation (1412/134), dated 23rd May, to a conference at the Admiralty, under the chairmanship of the Hydrographer of the Navy, to consider a scheme of time keeping at sea by means of a universal system of Time Zones, which had been adopted by the French Navy. The invitation had been accepted, and the conference had held a number of meetings, and would shortly draw up a report.

Treasury.—*Naval Meteorological Service.*—Read—the following letter from the Treasury (5510/C.11):—

17126/17.

Treasury Chambers,
11th June, 1917.

SIR,

THE Lords Commissioners of His Majesty's Treasury have before Them a proposal from the Board of Admiralty for the establishment of a Naval Meteorological service under the control of the Hydrographer. The proposal comprises the following staff as a charge to Navy Votes:—

1 Director of Naval Meteorological Service (Captain R.N.). £800 per annum.
1 Naval Assistant (retired Captain R.N.).
1 Naval Assistant (Lieut. or Lieut.-Commander R.N.) (this post to be filled at present by a Lieut. R.N.V.R., on full pay and allowances).
1 Sub-Lieut. R.N.V.R. on full pay and allowances for the period of the war.
4 Women.
1 Draughtswoman.
3 messengers.

The local Meteorological stations of the Royal Naval Air Service to be transferred to the new service, together with their existing staffs, the staff to be housed in the Admiralty buildings but to retain close touch with the Meteorological Office.

I am to enclose to be laid before the Meteorological Committee copies of the following correspondence, Treasury to Admiralty, 7th May, 1917; Admiralty to Treasury, 24th May, 1917.

My Lords will be glad to receive the views of the Committee upon the proposals of the Admiralty and in particular to learn how far the services of the Meteorological Office can be made available for the Naval service including the Air Services, and other special departments of the Navy, and what part of the necessary service must be provided for locally.

I am also to enquire whether the Committee can give Their Lordships any information in regard to the separate Naval Meteorological Service of the French Government referred to in paragraph 6 of the Admiralty Letter.

I am, &c.,
ROBERT CHALMERS.

The Director,
Meteorological Office.

Enclosure I.—Treasury to Admiralty.

14919/17.

Treasury Chambers,
7th May, 1917.

SIR,

NAVAL EXPENDITURE, EMERGENCY STANDING COMMITTEE.

I am directed by the Lords Commissioners of His Majesty's Treasury to state that They have had before Them the proposal (C.E. 138/17) of the Lords Commissioners of the Admiralty to establish a Naval Meteorological Service under the control of the Hydrographer.

In reply I am to request you to lay before the Board of Admiralty the following reply—The regular collection of a large number of returns from a wide area and the co-ordination and interpretation of the data thus obtained by a highly expert staff are the essential conditions of scientific weather forecasting. Both processes are at present concentrated in the Meteorological Office and the duplication of one or other by a separate naval staff cannot but lead to loss of efficiency and waste of labour. No such independent organisation has been found necessary to satisfy Army requirements. If Naval purposes require the forecasts and reports of the Meteorological Office to be supplied in any special form, My Lords have no doubt that that Department will readily arrange to comply with the desires of the Board of Admiralty.

Their Lordships are accordingly strongly of opinion that naval meteorological work should be confined to those operations which cannot be performed centrally, viz: the actual taking of observations and the application to local conditions of the forecasts issued by the Meteorological Office. For the control and direction of these activities a single Headquarters officer would appear sufficient, and it does not seem at all necessary that he should be of such high rank as the present Naval Assistant.

I am, &c.,
ROBERT CHALMERS.

Enclosure II.—Admiralty to Treasury.

C.E.

Admiralty,
24th May, 1917.

SIR,

I HAVE laid before My Lords Commissioners of the Admiralty your letter of the 7th instant, No. 14919, relative to the Naval Meteorological Service, and am commanded by Their Lordships to request that you will lay before the Lords Commissioners of the Treasury the following reply.

2. A Meteorological Service was founded by the Air Department in 1913 to meet the special needs that arose in connection with the Royal Naval Air Service which could not, it was found, be adequately met by the Meteorological Office. In view of the fact that the Hydrographer is the Admiralty representative on the Treasury Committee presiding over the Meteorological Office, and as such deals with all questions of Meteorology so far as they concern the Navy, it was considered advisable recently to transfer this Service to the Hydrographic Department.

3. There is no duplication of work whatever between the Meteorological Office and the Naval Meteorological Service. The former collects such observations as it can obtain from various parts of the United Kingdom—usually from voluntary observers—and from other countries, and it deduces therefrom, and issues, general forecasts of the weather for large areas. This information was found to be [*in*]*adequate* to meet the essential requirements of the Air Service. It was accordingly arranged to establish Meteorological Stations at certain specially selected Air Stations and to train specially as Meteorological Officers a number of officers who would work under the Naval Officers in command of the Air Stations. The work of these specially trained officers is to arrange ascents of pilot balloons with a view to obtaining observations of the direction and velocity of the wind; to record observations of barometric pressure, to exchange information with other Air Stations for use in cross country or Channel flights of Airships, and generally to obtain information as to conditions of weather both by taking local observations and by studying the information supplied by the Meteorological Office, so as to be in a position to give the best possible advice to the Officers in command of the Air Stations.

4. As already indicated, these requirements could not have been met by the existing staff of the Meteorological Office, and it would have been most undesirable to appoint, to deal with Naval needs, additional officers who would be responsible to the Meteorological Office instead of to the Admiralty.

5. My Lords gratefully acknowledge that the Meteorological Office have always shown the greatest possible readiness to meet the wishes of the Admiralty by supplying forecasts and reports in special form as required, but they are strongly of opinion that the work proposed to be assigned to the Naval Meteorological Service is quite outside the legitimate functions of that Office, and could not satisfactorily be done by it.

6. It should be observed that the French Government, which has a Meteorological Office of similar standing to ours, has already recognised the advantage of having a separate Naval Meteorological Service, and that a French Naval Officer was recently sent over to England to consult with the Officers of the British Naval Meteorological Service with a view to arranging for the regular exchange of meteorological information.

7. My Lords understand also that it has been found necessary to establish an Army Field Meteorological Service, both on the Western Front and in the Eastern Mediterranean.

8. The need for a well-organised Meteorological Service is greater in the case of the Royal Naval Air Service than in the case of the Royal Flying Corps, because the machines of the Naval Service work at a much greater distance from their base—sometimes upwards of 150 miles out to sea—where no safe landing is possible in the event of a sudden storm. Further, the Naval Air Service will shortly have in operation a number of dirigibles which are much more at the mercy of the weather than machines of the heavier-than-air type. It would be false economy to risk losing these vessels in order to effect a saving on the cost of the staff charged with the duty of studying the weather conditions and giving early warning of coming storms.

9. My Lords cannot concur in the suggestion that one Officer of comparatively junior rank at Headquarters should suffice to supervise the Meteorological activities of the Navy; one officer could not conduct even the routine work, and it is quite evident that something more than routine work must be provided for. The work of the staffs at the various stations, which now number twenty, must be co-ordinated, new stations added where found necessary, and the study of practical meteorology, a subject at present very little known, must be seriously undertaken; these require the active work of an officer of standing and experience if successful results are to be achieved.

10. In conclusion My Lords desire me strongly to urge that the matter may be reconsidered by Their Lordships of the Treasury.

I am, &c.,
V. W. BADDELEY.

Submitted—a memorandum of material for reply.

The Hydrographer explained that as the Board of Admiralty had already constituted the Naval Meteorological Service and placed it under his direction he was not in a position to discuss the reply which the Committee might make. He therefore asked leave to withdraw after pointing out that the action was the direct outcome of a necessity which the war had produced. (M.O. 5549.)

The Hydrographer having withdrawn instructions were given for a letter in reply to the Treasury to be circulated to the Committee before despatch.

Major Lyons.—Read—a letter from Major Lyons calling attention to the new civil decoration lately created, in relation to the work of the Office.

The Director was authorised, on behalf of the Committee, to communicate with Sir T. L. Heath on the subject.

645. Twelfth Annual Report.—Submitted—draft text of the Report for the year 1916–17.

It was agreed that the portion which it was proposed to print should be circulated to the Committee for approval, and subsequently forwarded to the Treasury.

Meteorological Office, Edinburgh.—*Accounts for* 1916–17.—Submitted—the following statement, drawn up by the Honorary Treasurer of the Scottish Meteorological Society :—

Statement of Account of Scottish Meteorological Society with the Meteorological Committee for Year ending 31st March, 1917.

Receipts.

	£	s.	d.
Balance carried forward	66	12	4
From the Meteorological Committee	350	0	0
On account of Reports supplied to the Registrar-General for Scotland	100	0	0
	£516	12	4

Expenditure.

	£	s.	d.	£	s.	d.
1. Salaries :—						
Superintendent ...	270	0	0			
Assistants	134	3	4			
Occasional Assistance	26	10	6			
				430	13	10
Workmen's Compensation Insurance					10	9
National Health Insurance ...				1	11	0
2. Furniture and Fittings				3	8	6
3. Binding Official Reports				1	3	6
4. Telephone—Rent for one Year ...				6	0	0
5. Registration of Telegraphic Address				1	1	0
6. Postages, Telegrams, and Petty Outlays				3	4	4
				£447	12	11
Balance carried forward				68	19	5
				£516	12	4

William B. Dixon,
Hon. Treasurer.

646. Office Staff.—**H. Jeffreys.**—Reported—that in accordance with Minute 623, Mr. H. Jeffreys had been appointed Senior Professional Assistant from 11th June until further order at a salary of £250 a year. A temporary certificate of exemption from military service had been obtained for him from the War Office. (Order 591.)

Besides the investigation referred to in Minute 623, Mr. Jeffreys will act as assistant to Capt. Cave in the inquiry referred to below. (Minute 647.) (Order 577.)

Approved.

W. J. Tomkins.—Reported—letter 5488/C.11/I of 29th May from Mrs. Tomkins, stating that according to private information received by her Private W. J. Tomkins is " missing " and is believed to be a prisoner.

Mr. Barstow undertook to ascertain the Treasury ruling for similar cases in the Civil Service.

It was agreed that official confirmation is necessary as authority for the continuance of the payment of the balance of his civil pay.

A. C. Broadbent (Minutes 614, 630).—The Director reported the death on 31st May of A. C. Broadbent, volunteer assistant. He had completed the tabulation of

monthly wind summaries for five years at the telegraphic reporting stations and had nearly completed a series of windroses representing the summaries which are a valuable addition to the information of the Office respecting wind on the British Coasts.

Reported—the following temporary exemptions from military service :—

E. P. Pearce, Instruments Division, till 29th August. Mr. Pearce when appointed (Minute 614) held a "rejection" certificate as medically unfit for military service, but had recently been re-examined and classed C1.

A. J. Tabor, Marine Division, till 9th August.

Office Boys and Boy Messengers.—*Rate of Pay.*—Reported—that boy messengers L. Featherstone and G. R. Parker had left the service of the Office for more remunerative posts, and that the following revised scale of pay for office boys and boy messengers had been brought into operation as from 4th June. The scale includes war bonus (Order 593) :—

Age last birthday	14	years	14*s.*	per	week.
,, ,,	15	,,	16*s.*	,,	
,, ,,	16	,,	18*s.*	,,	

Approved.

New Appointment.—*Miss A. W. C. Fitch.*—Reported—Order 587 appointing Miss A. W. C. Fitch (born 14th April, 1900) girl-clerk on the usual terms from 6th June. This appointment fills a vacancy in the Statistical Division caused by the transfer of Miss Despicht to the Forecast Division. (Minute 638.)

Miss I. Cook.—Reported—Order 595 appointing Miss Ida Cook (born 24th June, 1899) probationer with the following pay—

For the year following her	18th	birthday	22*s.*	6*d.*	per week,
,, ,, ,,	19th	,,	24*s.*		,,

with an additional 6*s.* per week war bonus. The appointment to date from 25th June.

E. W. Everest—Reported—Order 585 appointing Ernest Walter Everest (born 25th January, 1902) office boy and boy messenger to date from 4th June, at the revised rate of pay.

E. West.—Reported—Order 592 appointing Ernest West (born 22nd May, 1903) office boy and boy messenger, to date from 7th June, at the revised rate of pay.

The last two appointments are to fill vacancies referred to above.

Approved.

647. Observatories.—**Kew.**—*Rev. R. F. Rendell.*—Reported—that the Rev. R. F. Rendell, who was employed at Greenwich Observatory from 1892 to 1903 and was chief assistant at the Government Observatory, Natal, from 1903 to 1907, had applied for employment at the Office or at Kew Observatory, and had been accepted for service at Kew Observatory from 18th June at £3 a week for half-time service, and £5 a week for full-time service. The appointment is terminable by two weeks' notice.

Approved.

Eskdale.—*New Mechanic-caretaker and Housekeeper* (Minute 639).—Reported—that provisional approval had been given to the Superintendent's recommendation to appoint as mechanic-caretaker and housekeeper at Eskdale, Mr. and Mrs. John Burns, on the following terms :—

John Burns, mechanic and caretaker, at £2 5*s.* per week, paid monthly, with a war bonus of 7*s.* per week.

Mrs. Burns, housekeeper, at £75 per annum, paid monthly, with an allowance of 3*s.* per week from each of the assistants in residence to be collected by her. Out of these sums she will have to meet the cost of a maid's wages and board, on the understanding that five assistants besides the mechanic are to be provided for.

Both appointments are terminable by three months' notice on either side. Free quarters, coal, and light are allowed.

Mr. Burns's daughter will, it is understood, act as the maid.

The appointments are to date from 16th July. (Letter 1685/CE.11.)

Approved.

Benson.—*H. W. Baker.*—Reported—that in accordance with Minute 623, the services of H. W. Baker, mechanic, had been recovered for Benson Observatory as from 4th June. Pay is at the rate of 54*s.* per week with 7*s.* additional as war bonus. A certificate of exemption has been obtained.

Arrangements are in hand for the provision of materials for use in the workshop at Benson.

Approved.

Farnborough.—*Capt. C. J. P. Cave.*—Reported—Order 577 transferring Capt. Cave from Farnborough to London from 1st June for the purposes of developing the inquiry into the identification of the position of thunderstorms, and of preparing a report on the discrepancies between gradient winds and those deduced from observations of pilot balloons.

Mr. R. A. W. Watt.—Reported—Order 577 appointing Mr. Watt Meteorologist-in-Charge of the Branch Office from 1st June, Capt. Cave acting as Inspector.

Mr. N. Tunstall.—Reported—Order 577 appointing Mr. Norman Tunstall professional assistant at Farnborough from 18th June at a salary of £15 a month. Official lodgings are provided by the Office.

Approved.

648. Meteorological Section R.E.—*Home Station.*—Reported—that arrangements had been made for the establishment of a home station of the Meteorological Section on Chapperton Down, Lark Hill, Salisbury Plain, where observations of wind and temperature in the lower layers are required by the Artillery School.

It is proposed to place Lieut. Stewart in charge of the station and a corporal and three pioneers to act as assistants.

Approved.

649. Stations.—**Spurn Head.**—*Anemometer.*—Reported—that by the courtesy of the Hydrographer, Lieut. Gendle of the Hydrographic Department (Naval Meteorological Service) had visited Spurn Head in order to advise with regard to the Dines anemometer there, which has been running indifferently for some time, and that he had reported as follows :—

The instrument was found to be in a very clogged and dirty condition, the main cause being sand. The instrument was not put in order because there was not sufficient time and also because, under existing conditions, it was not considered that the instrument would remain long enough in working order to repay any time spent upon it.

The present hut containing the recorder is not proof against sand entering and is too small and too dark; some parts of the instrument are almost inaccessible because of these two latter defects.

It is suggested that a larger hut and one that is sand proof, fitted with hermetically sealed windows should be built round the recorder; as in view of the frequent cleaning necessary, unconstrained accessibility is of the utmost importance.

650. Director's Report and Accounts.—**Correspondence Section.**—Reported—Order 594 instituting a general registry for the Office correspondence, for dealing with the receipt and despatch of letters, publications, forms, &c., the filing of letters, and for the typing and making up of official letters.

Communication to Royal Society.—The Director reported—that he read a paper on "Revolving Fluid in the Atmosphere" at the meeting of the Royal Society on 21st June, giving examples of "revolving fluid" in the small secondary of 24th March, 1895, and in the tornado in South Wales on 27th October, 1913.

Accounts.—Submitted—the following statement of the Bank Account in the Cash Book :—

	£	*s.*	*d.*
Balance on 22nd May, 1917	6,025	7	3
Receipts from 22nd May to 26th June, 1917	775	9	10
	6,800	17	1
Cheques drawn from 22nd May to 26th June, 1917	4,182	13	11
Balance on 26th June, 1917	£2,618	3	2

EIGHTIETH MEETING.

South Kensington, S.W. 7, 24th October, 1917.

PRESENT :

THE DIRECTOR, IN THE CHAIR.

THE HYDROGRAPHER. | MAJOR LYONS.
DR. SCHUSTER.

651. The Minutes (643–650) of the last Meeting (27th June, 1917), previously circulated, were taken as read, and confirmed.

652. CORRESPONDENCE.—**Treasury.**—*Naval Meteorological Service.*—Reported—that in accordance with Minute 644, the Director had prepared a draft reply to the Treasury and had obtained the approval of the Members of the Committee by correspondence. The text of the letter is as follows :—

C.11/5510.

SIR, 5th July, 1917.

THE Meteorological Committee have carefully considered their Lordships' letter, 17126/17 of 11th June, 1917, and the correspondence between the Treasury and the Admiralty forwarded therewith ; they desire me to make the following reply :

The Committee are much gratified to learn that it is the intention of the Lords Commissioners of the Admiralty to form a Naval Meteorological Service as a section of the Hydrographic Office, and anticipate that much benefit will accrue therefrom to Meteorological Science.

They have some difficulty in expressing an opinion as to the scope of the organisation which the Lords of the Admiralty are establishing, because they recognise that a meteorological service for a special department is on a different footing from that of the Meteorological Office.

They can only refer by way of precedent to the organisation which has been adopted by the Army Council in consultation with the Meteorological Office for the service of the Armies in France. Consisting at first of four officers who were attached to the Royal Flying Corps at G.H.Q. in France, it is now a special unit of the Corps of Royal Engineers, authorised for the period of the war. The establishment includes a Major as Commandant, four Captains, nine subalterns and, at present, 53 N.C.Os. and men ; more than half of the whole number have the science degree of a University. From it are drawn the meteorological officers and observers required by the several armies, and its meteorological reports are made to the Headquarters staffs. According to an arranged plan, the Meteorological Section R.E. is supplied by telegraph four times daily from the Meteorological Office in London with all the necessary material for making a weather map of N.W. and W. Europe, and with the inferences drawn therefrom, as well as with any additional information which may be required and with assistance in special investigations. It arranges its own issues to the Army, but reports daily its observations to the Office by telegraph and supplements them by weekly schedules.

The same arrangements hold for the Mediterranean detachment of the Section.

In the working out of this scheme, the Meteorological Office remains responsible for the following duties :—

I. The collection of information by telegraph from selected stations in this country and abroad, and the preparation of daily forecasts and Weather Reports.

II. The collection, tabulation and discussion of meteorological information from all parts of the world.

III. The investigation of any problems in meteorological science that may arise, and the publication of the results obtained.

IV. The co-ordination of the various meteorological agencies of the country and generally of the Empire ; the improvement of common standards for instruments &c. in common use.

Without trenching upon the general duties of the Office, there still remains, as stated by the Lords Commissioners of the Admiralty, a large and important field of work for Naval Meteorological Stations placed at selected points where observations could be taken, local conditions studied, and the general forecasts of the Meteorological Office amplified in the light of local conditions for the benefit of the Naval Services in their neighbourhood. The work at headquarters would presumably include :—

(1) General supervision and control of the meteorological work of ships and stations, and of the supply of instruments.

(2) Organisation and maintenance of local meteorological stations for receiving, charting, manifolding and distributing information which has been supplied by the Meteorological Office and supplemented by local arrangement.

(3) Inspection of the local establishments of both kinds.

(4) Arrangement with the Meteorological Office as to the information to be supplied to naval authorities and the method of its distribution.

The Forecast Service of the Meteorological Office is not voluntary or fortuitous as suggested in the correspondence; with the supply of instruments to the Navy and the discussion of Marine Observations it is a first charge on the funds of the Office. The net-work of stations for the service of the Daily Weather Report has been most carefully organised in concert with the representatives of all other European Countries by an International Committee of long standing of which the Director of the British Service is Chairman. It is most desirable, therefore, that the organisation of the reporting stations for the Daily Weather Report should not be changed, and that the instruments and methods of observing at such stations should be compared regularly with those of the Meteorological Office.

The Meteorological Committee desire to lay stress on two points which they believe to be essential to the formation of an efficient Meteorological Service of the kind proposed :—

(*a*) That no forecast should be prepared without a record of the grounds on which it is based to be kept for future reference. This is the only protection against the demands, often made upon all authorities responsible for meteorological work and very difficult otherwise to deal with, of men with secret methods who challenge a trial of their method without disclosing its scientific basis.

(*b*) That Meteorological Officers should have an education which includes a thorough grounding in physics and mathematics, and that they should be given opportunities to make themselves acquainted with the methods employed at, and the investigations undertaken by the Meteorological Office.

Their Lordships of the Admiralty state that "the study of practical meteorology is a subject at present very little known." In providing staff for the meteorological service of the Army the Office has been most careful to lend, in the first instance, the most fully trained and capable members of its own staff, and subsequently only to accept for service men with scientific qualifications of the highest class, and to provide some months of special training for them. Beyond the rudimentary stages, which are easy, the study of practical meteorology is a difficult one, requiring special training. If it is to be seriously undertaken (and the Meteorological Committee concur with Their Lordships of the Admiralty in thinking that it must be) it is necessary that it should be regarded as forming the life-work of men who have the requisite qualifications.

The science of meteorology is developing very rapidly at the present time and the absence of instruction in advanced meteorology at the Universities makes it difficult to obtain young men who have had a full training in this subject. The Meteorological Offices of this country and of the Dominions have therefore to make their own provision for training in the necessary knowledge of the special subject.

The Committee suggest that the Lords Commissioners of the Admiralty should consider the possibility of Their Meteorological Officers taking up the work of a Professional Assistant at the Meteorological Office for three or four months at a time, so as to enable them all in turn to become thoroughly familiar with the recent advances in the subject and their practical application. This would also facilitate the maintenance of uniformity of standard and procedure which is essential if the material provided from both sources is to be utilised to the best effect. This would be analogous to the employment of officers on the active list of the Royal Engineers in the telegraph service of the Post Office, which has, it is understood, been the practice for many years.

The experience of the Meteorological Office would indicate that, in order to direct and carry out at Headquarters the work of a Meteorological service of the character that has been assumed, not less than four officers of high educational qualifications and technical training in the subject would be required, since corresponding duties at the Meteorological Office would be allotted to Superintendents and Professional Assistants having first class qualifications in mathematics and physics of university standard.

With regard to the separate Naval Meteorological Service of the French Government, no information as to its recent development has reached the Meteorological Office. The official representative of the French Government at all international meteorological assemblies is the Director of the Bureau Central Météorologique, which belongs to the Department of Public Instruction. It is understood at the Office that there are in France two separate networks of stations which report daily by telegraph to the Bureau; the one belongs to the Bureau itself, the other belongs to the Ministry of Marine and is beyond the reach of criticism. At one time the British Meteorological Service acted as "Gale-warning" authority for the French coasts, owing to some interdepartmental difficulties. In more recent years the Ministry of Marine had no professional meteorologists of its own, and the relations with the meteorologists of the Bureau were so restricted that France made little use, for practical purposes, of the Director of her own Bureau, one of the ablest meteorologists of the world. He has been allowed to busy himself almost exclusively with climatic work, to the great loss of practical meteorology. No recent contribution to meteorological literature is due, so far as is known, to the French Marine, which had made no sign of helping their national system, in the obvious matter of wireless, before the outbreak of war. We were much more fortunate in this country.

Up to the commencement of the war, the central establishment of the meteorological service of Germany for forecasts and gale-warnings was at Hamburg, where it formed two sections of the Seewarte, a Naval Institution; the centre for other sections of meteorological work was in Berlin, attached to the Ministry of the Interior. In Austria, the Central Institute is at Vienna, largely controlled by the Academy, while the Naval Meteorological Service has its headquarters at Pola. In

the United States the Weather Bureau, which belongs to the Department of Agriculture, is responsible for all forecasts and gale-warnings. It collects observations from the sea but the Hydrographic Department issues the Monthly Marine Charts ; and it must be remembered that in all these countries it is the study of rainfall which forms the central nucleus of the meteorological organisation, whereas in our own country the work of the Office centres in the requirements of seamen, including forecasts and warnings.

Thus there are other precedents besides that of the French Service which should be taken into account ; each country has to make its own arrangements. In our own, the national establishment for meteorology has not been attached to any department of government on the ground that in an independent position it can best serve the requirements of all. The Meteorological Committee see no difficulty about maintaining this view while providing all the necessary facilities for, and co-operating effectively with, the proposed Naval Meteorological Service.

I am, etc.,
NAPIER SHAW.

The Secretary,
H. M. Treasury,
Whitehall, S.W. 1.

Colonial Office.—*Meteorological Data in Colonial Blue Books.*—Read—the following correspondence with the Colonial Office :—

580/1849.

Colonial Office,
Downing Street,
9th July, 1917.

SIR,

WITH reference to your letter No. 580 of the 31st July, 1914, and previous correspondence, respecting the meteorological returns submitted from the various Colonies, I am directed by Mr. Secretary Long to inform you that a Committee is sitting at this time at this Office to consider the question of improving the annual Blue Books of the various Colonies in which these Returns have hitherto been included.

2. It is contemplated that for commercial purposes Blue Books should in future be supplemented by other publications and that they should be used primarily and essentially, as indeed they have chiefly been used in the past, for administrative and official purposes.

3. The question upon which it is desired to seek the benefit of your advice and assistance is that of the Meteorological Returns. It is doubtful whether the returns could usefully be included in any of the publications which it is hoped will be issued in future for trade purposes, as those publications will probably be issued at irregular intervals and not annually.

4. It appears from the correspondence under reference that the Returns are sent to you separately from the various Colonies and are distributed by you to various institutions at home and abroad. In these circumstances I am to inquire whether you have any views as to the desirability of including these Returns in the Blue Books. Subject to your concurrence Mr. Long is somewhat disposed to think that the returns of daily observations might in any case be omitted.

5. I am to enquire whether in view of the fact that it is proposed to improve and recast the Blue Books generally, you would wish to offer any suggestions for remodelling the forms for the Colonial Returns at present sent out to the Colonies from this Office (copies enclosed).

6. I am further to ask whether the returns from all the Colonies or from groups of Colonies are published in one volume, and whether—if this is not already done—you consider that there would be any advantage in issuing them in this form.

7. Mr. Long will be obliged if he might be favoured with an early reply to this letter as the Committee, which is at present examining the Blue Books, is now sitting and hopes to complete its labours at an early date.

I am, etc.,
H. J. READ.

The Director,
Meteorological Office.

580/1849.

SIR,

13th July, 1917.

IN reply to your letter of 9th July, I note that Mr. Long quite wisely raises again a number of questions about which there has been a good deal of correspondence dating back (so far as this Office is concerned) to 1870.

The latest phase of the negotiations is represented by Lord Elgin's circular dispatch of 6th March, 1907. The meteorological work of the Colonies has never been properly organised and it is very desirable that opportunity should now be taken to put it on a proper footing. No formal obligation lies upon this Office in the matter : our interest in it depends upon two circumstances :

(1) Our knowledge that sooner or later trustworthy meteorological observations upon an organised plan are found to be necessary for every civilised community, and

(2) The international associations of this Office lead to requests being made upon it for information about the climate and weather of British Colonies for scientific or economic purposes by the Government Meteorologists of foreign countries, and in the absence of any special organisation for the purpose, we have done our best to meet what are obviously legitimate inquiries and such as in all other countries possessing colonies are dealt with by the meteorological establishments of the home government.

With regard to the separate paragraphs of your letter

2. As to the Blue Books: while it is not necessary that formal meteorological schedules should appear in publications which are used primarily for administrative and official purposes, it is to be remarked that climate and weather are of such paramount importance to the economics of any community that no effective administrative report can be written without some reference to these influences upon life, health and wealth. I need only recall to Mr. Long's attention the fact that in a "semi-arid" country, for example, the whole course of administration is dependent upon the annual rainfall, and I may remind him that an administrative report for the Home Country this year would be notably incomplete unless it referred to the long and belated winter which so seriously affected the food-supply at a critical period. No country is so fortunate as to have its administrative concerns independent of climate and weather.

The administrative reports, therefore, require a well-drafted paragraph upon those features of the year's weather which affect the economic situation. Such a paragraph requires a considerable amount of skill to draft it, and from the paragraphs which I have read in Colonial Blue Books, the Colonial officials are not, as a rule, skilled in that way. From an examination I should say that the tables are added in order to avoid making a verbal statement: but while they are indispensable as furnishing the necessary material, they cannot really take the place of a well-drafted verbal note.

How to get suitable verbal notes drawn is another question. Some years ago I gave a course of lectures upon the "Climates of the British Empire" at the London School of Economics, and from the acceptance which the lectures found there, I feel myself justified in suggesting that such a course of lectures might be arranged as a permanent part of the school of economics, and that the lecturer should be, at the same time, the official in charge of the Colonial observations, presumably at this Office.

3, 4 and 6. As to the best method of collecting and publishing the Colonial returns.

The present practice is of a very disorganised character. We collect here—

(1) Printed copies, 100 each (reprints from Blue Books, etc.) of returns from 25 Colonies, which we distribute to the chief meteorological offices of the world. They offer a variety of shapes and sizes and form a difficult collection for a librarian to deal with.

(2) M.S. copies from 8 Colonies, which we examine and summarise, but which, in spite of various efforts, we have, at present, no means of printing. We had only just organised the work when the war began.

Certainly an annual volume of the meteorological returns from the British Colonies is by far the best way of dealing with the matter, but that again requires some organisation.

We find, as a rule, that the returns are not critically examined in the Colonies, partly because no official there has the experience necessary to deal with them. If they are dealt with here, we require the detailed daily observations as well as the summaries computed from them. The discussion of the observations must be assigned as a definite duty to this or some other Office. I have already provided that this should be done so far as the returns which we now receive are concerned, and I think we have the supervision of all Colonial returns that come here up to date.

But the organisation cannot be complete unless there is some provision for a periodical inspection of the stations by a competent external official. If the observers are left entirely to themselves, the observations become unreliable, in spite of the most elaborate examination of the returns. We have experience of this in the case of Cyprus, the meteorology of which was administered from here until it became apparent that the Egyptian Service would do it better because they could inspect. The same kind of arrangement might provide for the inspection of the remoter colonies.

There is a common feeling, probably because the weather is common knowledge at the time of its occurrence, that any person who knows what instruments are, can carry on a satisfactory series of observations, but considerations of punctuality and trustworthiness in recording do not always go with the ability to take a reading.

5. The forms of which you enclose copies are antiquated. They date back to 1870. The arrangement of these forms is a matter of international agreement, and I think Lord Elgin's dispatch made provision for the supply of revised forms from here. If not, that should be arranged now.

6. I have already mentioned that the returns from the Colonies are not now collected into one volume: not all are published; in so far as they are published they are published separately. It would be much better to collect them into one volume which might perhaps be modelled upon the Monthly Weather Report of this Office which is practically identical in form with the Canadian Monthly Weather Review, the Indian Monthly Weather Report and the Commonwealth Monthly Weather Review.

At the same time I must point out that the real immediate value of the observations is not to this country but to the Colonies themselves. Our interest in the matter is simply that the information should be available for all those interested in the Colony in question. For the locality, the observations are indispensable as a trustworthy public record: so that provision must be made for the necessary copies of the returns to be available for the Colonial authorities. The best way of securing the distribution without printing the same things twice requires consideration.

I am, etc.,

NAPIER SHAW.

The Under-Secretary of State,
Colonial Office,
London, S.W. 1.

The Director reported that he had had an interview with the officer responsible for the Colonial Blue Books and after further correspondence it had been arranged that the daily observations should be omitted from the Blue Books, being replaced by Annual Summaries accompanied by a statement of the main features of the weather during the year. The

schedules of daily observations were to be continued in the Colonies, and copies were to be sent to the Meteorological Office for inclusion in the *Réseau Mondial.* The forms supplied by the Colonial Office for the use of meteorological observers had also been revised and modified at the Meteorological Office.

Foreign Office.—*Request of French Government for literature on hail, lightning, &c.*—Reported—a request from the French Ambassador, transmitted by the Foreign Office, for copies of English publications dealing with hail and thunderstorms, and the best means of mitigating the effects thereof, for the use of a special Committee formed by the French Ministry of Agriculture for the investigation of the subject.

A reply had been sent, forwarding copies of official publications together with a list of references to scientific literature dealing with the elements under reference, and stating that the office placed no reliance on artificial methods of weather control.

Russian Meteorological Office.—*Address for telegrams.*—Reported—the receipt on 16th September of a telegram from the chief of the Russian Military Meteorological Office, stating that the dispatch of telegrams from Russia to registered addresses had been discontinued, and asking whether the weather reports sent to London might be addressed *en clair.* Meanwhile the Russian telegrams had ceased. The Hydrographer had been good enough to obtain the permission of the Lords Commissioners of the Admiralty for the use of the address "Weather, London" for such messages, and the reports had recommenced. Recently the objection on the part of the Russian Government to the registered address had been waived.

Ministry of Reconstruction.—*Report on post-war problems.*—Reported—the receipt of letters 5769 and 5769/2 (C. 11/Z) from the Ministry of Reconstruction, asking for a report on any steps taken by the Meteorological Office with regard to post-war problems concerning the British Meteorological Service. A reply had been sent stating that the Meterological Committee would themselves deal with the questions, and the Director had drafted a memorandum on the subject, copies of which were circulated to the Committee shortly before the meeting.

It was agreed to await the comments of the Members of the Committee before taking further action.

Hydrographer.—*Visit of M. Renaud.*—Reported—that by introduction of the Hydrographer, M. Renaud, Hydrographer to the French Navy, had visited the Office on 29th June.

County Fire Office.—*Insurance against Air Raids.*—Reported—the receipt of a circular letter 008/2415 of August, 1917, from the County Fire Office, quoting a rate of 7*s.* 6*d.* per £100 salaries of the Meteorological Office staff to cover insurance against claims for personal damage during the operations of hostile air-craft, during attendance at the Office.

It was agreed to take the opinion of the Treasury upon the matter.

653. 12TH ANNUAL REPORT.—Reported—that the Report was now in the press, and that proof copies would be submitted for approval shortly.

654. OFFICE STAFF.—**Forecast Division.**—*Scheme for continual attendance.*—Submitted—a memorandum by Mr. Lempfert, with notes by Major Lyons, regarding a scheme by which a forecast staff consisting of a forecaster and a senior technical assistant should be constantly on duty. The 1 a.m. work had been hitherto undertaken by a professional assistant, who prepared the map from the information collected and telephoned Mr. Lempfert or Mr. Dines for advice in the forecasting. The forecasts sent out during the night had now become of considerable importance, and it was thought advisable to secure the attendance of a forecaster to deal with them. Under the scheme there would be four forecasters required, Messrs. J. S. Dines, R. Sergeant, E. V. Newnham and one other; Mr. H. Harries would act as Assistant to Superintendent, and Mr. C. E. P. Brooks, M.Sc., Librarian, would be detailed for duty two afternoons a week for instruction in forecasting, in order to be available as a substitute in case of need. An additional Senior Technical Assistant would also be required, and it was

proposed to transfer Mr. H. Keeton, Staff Assistant, from the Marine Division, and to provide a draughtsman in his place. The Junior Technical Staff were sufficient, but an additional Junior Professional Assistant would be required to ensure satisfactory working of the scheme.

Approved.

W. H. Parsons.—*Arrangements during incapacity.*—Reported—that Mr. W. H. Parsons, Office Keeper, had been absent on sick leave since 19th June, 1917, and was incapable of managing his own affairs. The consent of the Committee had been obtained by correspondence to the continuance of his full pay up to the present, and the Office had paid therefrom the cost of his maintenance at the Institution to which he had been sent, and of his endowment assurance, forwarding the balance to his wife.

Read—Letter of 5th September, 1917, from Mrs. Parsons regarding the deductions made for insurance.

It was agreed to continue the payment of full salary as hitherto until 31st December, 1917, and to place Mr. Parsons upon the Superannuation List as from that date.

W. J. Tomkins (Minute 646).—Reported—Receipt of a communication from Mr. W. J. Tomkins, stating that he was a prisoner of war in Germany, and asking that the payment of the balance of his civil pay might be made to his wife during his absence.

It was agreed, in accordance with Treasury regulations, to continue the payment of the balance of his civil pay to Mrs. Tomkins.

J. E. Bassett.—Read—Letter dated 13th October, 1917, from J. E. Bassett, Assistant Packer in the Instruments Division, asking for an increase in his wages in view of additional work thrown upon him.

It was agreed to appoint J. E. Bassett as Packer, at a salary of £1 15*s.* per week, with war bonus of 8*s.* a week, and to provide an assistant packer for the Instruments Division.

Office Keeper's Staff.—*Reorganisation.*—Reported—Order 619 providing for the attendance of a Senior Office Keeper from 9 a.m. to 5 p.m., and for two Junior Office Keepers, who will take duty alternately from 7.15 a.m. to 3.30 p.m., and from 1 p.m. to 8.30 p.m., Sunday evening duty being taken by all Office Keepers in rotation. The duties of the staff are rearranged. The order also provides that the commencing salary of a Junior Office Keeper shall be £85 per annum, with a war bonus of 8*s.* per week.

Approved.

W. H. Baker.—*Promotion.*—Reported—Order 611, appointing W. H. Baker, of Benson Observatory, Staff Assistant, to date from 1st September, 1917, on the recommendation of Mr. W. H. Dines, F.R.S.

Approved.

New Appointments.—The following orders were reported for confirmation :—

Order 598, appointing *Miss Edith Gertrude Picknett* (born 13th December, 1899), Probationer in the Correspondence Section, to date from 2nd July, 1917, at the following rates of pay :—

For the year following 17th birthday	... ...	19*s.* per week.
,, ,, ,, 18th ,,	... ...	20*s.* 6*d.* ,,
,, ,, ,, 19th ,,	... ...	22*s.* ,,

with a war bonus of 6*s.* per week.

Order 615, appointing *Arthur Clarence Lloyd* (born 6th September, 1901), for service at Kew Observatory with a view to his becoming Probationer on attaining the age of 17 years. The commencing salary is 16*s.* a week (including the 2*s.* a week additional for duty in London area), with a war bonus of 6*s.* per week. The appointment dates from 2nd September, 1917.

Order 618, appointing *Ernest Glenister* (born 17th February, 1901), as Office Boy and Messenger at a salary of 18*s*. per week, to date from 11th September, 1917.

Order 620, appointing *Commissionaire John Lloyd Evans*, Junior Office Keeper, at a Salary of £85 per annum, plus a war bonus of 8*s*. per week. The appointment dates from 17th September, 1917.

Order 623, appointing *Miss E. H. Geake, B.Sc. Lond., M.Sc. Bristol* (born 26th March 1888), Junior Professional Assistant in the Secretarial Division, to date from 15th August, 1917, at a salary of £175 per annum rising to £200 per annum. The appointment is on probation for six months.

Approved.

G. N. Pingriff.—*Proposed employment.*—Reported—Application for employment, dated 29th September, 1917, from Mr. G. N. Pingriff, B.Sc. Lond., Science Schoolmaster, rejected for military service on medical grounds.

The Director was authorised to appoint him Senior Professional Assistant, should a vacancy arise, at a salary of £225 per annum, with the endowment assurance provided for in Minute 527.

Exemptions.—Reported—The following extensions of temporary exemptions :—

E. P. Pearce (Minute 646) until 29th November, 1917.

A. J. Tabor (Minute 646) until 26th October, 1917.

Approved.

655. Programme of Work for 1918.—Owing to the exceptional circumstances of the war, it was not proposed to draw up a formal programme of work. The conditions remained the same as during the last two years. (Minutes 554 and 608.)

656. Publications.—*New issues received.*—Copies of the following were laid on the table :—

Observer's Handbook, 1917.

Computer's Handbook, II., Sub-sections II., III., IV.

Charts of Baffin's Bay and Davis Strait.

Weather Map, 4th issue.

New issues in press.—Reported—That new editions of the following publications had become necessary and had been put in hand :—

Mediterranean Charts.

Seaman's Handbook.

Marine Observer's Handbook.

Meteorological Glossary, 4th issue.

It was agreed that the confidential character of the information contained in the Meteorological Glossary was no longer such that it might not be distributed to the public, and the Director was authorised to place the publication on sale in the usual manner.

Travel of Cyclonic Depressions and Tornadoes.—The Director reported that he had prepared a paper on the above subject, and asked for authorisation to print it at once as a Geophysical Memoir.

Approved.

Programme of Publications for 1918–19.—Submitted—the following :—

Periodical :

Daily Weather Report (1919) (550) (900 to 950 is the normal number).

Monthly Meteorological Charts of the Atlantic Ocean (1919) (500 + 200 for Admiralty + 275).

Monthly Meteorological Charts of the Indian Ocean (1919) (150 + 200).

British Meteorological and Magnetic Year Book:

Part I.—Weekly Weather Report (1919) (375 + 75). (The daily weather maps have not been printed since August, 1914. Each map when it appears should occupy a full 4to page.) Appendices I. and II., as before.

Part II.—Monthly Weather Report (1919). Monthly Summaries (600 + 100 + 700 for Royal Meteorological Society + 150 for Scottish Meteorological Society + 25 each of two plates).

Annual Summary, including wind summary for the year (700 + 100 + 700 for Royal Meteorological Society + 150 for Scottish Meteorological Society + 25 each of two plates).

Part III., Section 1.—Daily Readings at Stations of the First and Second Orders with Annual Review (1919) (250).

Section 2.—Geophysical Journal, with Annual Review of the Investigation of the Upper Air (1918) (400).

Part IV.—Hourly Values from Autographic Records (1916) (400).

Part V.—Réseau Mondial (1914) (500).

Observer's Handbook, 1918 edition (100 + 400).

[Summary of Maritime Weather Signals at present in use in the various countries of the globe (1918 edition) (125).]

Calendar, with Notes and Diary for the use of observers, for 1919 (550).

Occasional:

Handbook of Meteorology for the use of the Naval and Military Services. (Royal 8vo.)

Other occasional publications will be guided by the requirements of the Naval and Military Services. They may take the form of the following:—

Monthly Meteorological Charts of the Mediterranean Basin.

Weather Map and Meteorological Glossary. New issues as required. (Royal 16mo.)

Gales on the British Coasts. (Royal 8vo.)

Geophysical Memoirs. Manuscript of several is practically ready. (Royal 4to.)

Computer's Handbook (500). Further portions are in preparation. (Royal 8vo.)

Tabulator's Handbook (500). (Royal 8vo.)

Normals of Temperature, Rainfall and Sunshine for 1881–1915. (Royal 8vo.)

Twelve Monthly Charts of the South Atlantic Ocean (M.O. press).

Atlas of Tropical Hurricanes (500 + ?).

Memoir on the distribution of ice (if not already completed).

[Climatological Atlas of the British Isles.]

[Monthly Charts of Mean Temperature of the Atlantic, South of latitude 50° N., in co-operation with the Danish Institute.]

Note.—The dates appended to the titles of the periodical publications are the dates of the latest volume of the series for which authority is required.

Publication of the works enclosed in square brackets is not expected to occur until after the war.

657. ESTIMATES FOR 1918–19.—Submitted—the following materials for estimates for the year 1918–19 :—

METEOROLOGICAL OFFICE.

PROVISIONAL ESTIMATE OF CHARGES UPON THE GRANT FOR 1918–19. SCHEDULE I.

Service.	Spent 1916–17.	Voted 1917–18.	Spent Half-year.	Proposed 1918–19.	
	£	£	£	£	£
Salaries (*see* Schedule II.) (145 posts) :—					
Office (98 posts)	—	13,603	6,998	15,239	
Observatories (36 posts)	—	4,079	2,262	4,627	
Insurance	—	45	25	45	
Meteorological Field Service (11 posts) ...	—	1,670	136	1,647	
War Bonus...	—	—	—	1,250	
		19,397	—	22,808	
Less Army Pay and deductions on account of members of the Staff on War Service.	—	2,543	—	2,496	
	15,812	16,854	9,421		20,312
Office Expenses:					
Rent, Heating, and Lighting	688	700	345	700	700
Furniture and Equipment	123	100	28	100	
Library	25	50	13	50	
Insurances and Repairs	73	120	3	120	
Incidental Expenses and Consumable Stores...	259	250	69	200	
					470
Post Office Charges:					
Postage	754	750	388	800	800
Telephones	92	100	99	120	120
Telegrams from inland stations	1,239	900	636	} 1,500	
„ Airships	—	—	112		
„ from abroad	1,286	1,455	772	1,500	
„ sent abroad	475	—	426	850	
„ Gale Warnings	22	—	—	—	
„ Harvest Forecasts	17	50	—	—	
„ sundry messages, &c.	29	60	11	60	
Allowances to Clerks	110	200	92	200	
					4,110
Stationery Office (S.O.P.)	70	100	64	100	
Advertising Account	8	20	4	20	
					120
Travelling Expenses	203	200	82	150	150
Superannuation:					
Annuities	562	562	281	562	
Pensions not chargeable on Fund	112	25	13	25	
„ chargeable on Fund	276	276	138	276	
Contribution to Fund	237	474	—	1,000	
					1,863
Purchase of Instruments:					
Royal Navy	4,744	4,000	1,993	4,000	
For Office use	331	300	} 3,291	6,000	
Other commissions	4,727	4,000			
					10,000
M.O. Observatories (excluding salaries) (*see* Schedule III.) :					
Richmond	401	422	151	450	
Eskdalemuir	710	520	161	550	
Cahirciveen	174	168	78	160	
Falmouth	135	170	78	160	
Farnborough	471	205	149	300	
Benson	121	178	72	160	
					1,780
Auxiliary Observatories and Stations:					
Subventions : Aberdeen...	295	295	147	295	
Armagh	50	50	25	50	
					345
Salaries of Observers : Anemograph stations...	25	} 670	{ 8	} 670	
Telegraphic stations ...	668		{ 319		
Climatological stations	45	100	19	100	
					770
Incidental Expenses : Rents, Rates, Taxes, &c.	7	10	2	10	
Cost of Forms, &c. ...	145	150	36	175	
Agents' Fees	35	60	9	20	
Labels	5	10	3	10	
Postage, telephones, and telegrams, &c.	30	50	18	50	
					265
British Rainfall Organization	55	55	13	55	55
Atmospheric Pollution	—	—	70	500	500
Edinburgh Office	374	375	190	380	380
Lectures and Experiments:					
Schuster Readership	—	—	—	—	
Lectures, &c.	—	—	—	—	
Contribution to International Publication ...	—	—	—	—	
Total	36,020	35,034	19,829	—	42,740

APPROPRIATIONS IN AID. SCHEDULE I.—*continued.*

Service.	Realised 1916–17.	Voted 1917–18.	Realised Half-Year.	Proposed 1918–19.	
Subventions for observatories:	£	£	£	£	£
Advisory Committee for Aeronautics	250	250	250	—	
„ „ „ Atmos. Pollution ...	—	—	500	500	500
Royal Society	1,507	1,411	726	1,511	1,511
War Office	44	65	16	100	100
Antarctic Fund	164	164	82	—	—
Expenses refunded:					
M.O. observatories	132	195	53	170	170
Auxiliary observatories and stations	92	100	63	130	130
M.O. departmental:					
Administration, &c.	71	60	33	60	
Forecasts	3	5	1	—	
Instruments	227	150	153	319	379
M.O. incidental:					
Administration, &c.	53	80	16	30	
Forecasts and Daily Report	285	80	32	60	
Instruments	36	10	20	40	130
Stationery Office Account	64	100	42	100	
Advertising Account	8	20	5	20	120
M.O. telegraphic expenses:					
Home	22	50	17	—	—
Foreign (from abroad and sent abroad) ...	635	1,100	1,592	—	—
M.O. telephone charges	1	2	1	2	2
Inspections	148	100	94	100	100
Instruments (Royal Navy)	4,751	4,000	1,986	9,700	
„ (other sources)	4,162	4,000	2,314		9,700
Superannuation annuities	574	562	281	562	
Invested fund—interest	32	30	21	42	604
Lectures and experiments	—	—	—	—	—
Total Appropriation in Aid	13,261	12,534	8,298	—	13,446

STATEMENT OF ESTIMATED CHARGES UPON THE GRANT FOR 1918–19.

SALARIES, including normal increases: OFFICE AND OBSERVATORIES.

SCHEDULE II.

Establishment.	—	Meteorological Field Service.	Administration and Library.	I. Marine Division.	II. Forecast Division.	III. Statistical Division.	IV. Instruments Division.	Richmond.	Eskdalemuir.	Cahirciveen.	Falmouth.	Farnborough.	Benson.	Atmos. Polln.	Totals. 1918–19.	
																£
	Director	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1,000
	Secretary	—	1	—	—	—	—	—	—	—	—	—	—	—	1	182
	Professional Staff:															
10	Superintendents, Commandant, and Meteorologists-in-Charge.	1	—	1	1	1[1]	1	1	1	1	—	1	1	1	11	4,262
7	Senior Professional Assistants (225–330)	1	2	—	4[1]	—	—	—	—	—	—	1	—	—	8	2,155
5	Junior Professional Assistants (125–200)	2	1	—	2[2]	—	—	—	—	—	—	—	—	—	5	998
1	Graduate Assistants (60–100)	—	1*	—	—	—	—	—	—	—	—	—	—	—	1	80
	Classified Clerical and Technical Staff:															
12	Chief Clerk and Assistants (175–330)	—	5	4	4	3	3	2	1	—	—	—	1	—	23†	5,154
8	Clerks (125–150)	—	2	1	2	4	1	—	—	—	1	—	—	—	11	1,794
	Clerk Assistants (75–150)	—	2	2	1	1	1	—	—	—	—	—	—	—	7	756
8	Clerk Computers (75–110)	1	1	1	1[1]	1	1	—	2	—	—	1	—	—	9	878
8																
	Additional Staff:															
	Mechanical Assistants	—	—	—	—	—	—	1	1	—	—	—	—	—	2	221
	Supernumerary Clerks	—	—	—	—	1	—	—	—	1	—	—	—	—	2	178
	Probationers	4	4[1]	2	1[2]	1	[1]	2	—	—	—	—	—	—	14	765
	Boy and Girl Clerks	1	5	2	1	4	2	1[1]	4	2	1	—	—	—	23	1,348
	Office or Laboratory Boys and Improvers.	—	—	—	—	—	2	—	—	—	—	—	—	—	2	173
	Allowance for Vacancies and Revision.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Office Keeper's Staff:															
	Office Keepers ... (80–110)	—	4	—	—	—	—	—	—	—	—	—	—	—	4	396
2	Storekeeper	1	[1]	—	—	—	—	—	—	—	—	—	—	—	1	100
	Caretakers	—	—	—	—	—	—	1	1	—	—	—	—	—	2	157
	Messengers	—	1	—	—	—	—	1	1	1	—	—	—	—	4	226
	Boy Messengers	—	5	—	—	—	1	—	—	—	—	—	—	—	6	266
	Cleaners	—	4	—	—	—	—	1	1	1	—	—	—	—	7	215
	Watchman	—	1	—	—	—	—	—	—	—	—	—	—	—	1	30
	Lift Attendant	—	1	—	—	—	—	—	—	—	—	—	—	—	1	60
	War Bonus															
	Occasional Sunday Duty ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	119
	Insurance (National Health and Employers' Liability).	—	—	—	—	—	—	—	—	—	—	—	—	—	—	45
	TOTALS	11	42	13	23	17	13	11	12	6	2	3	2	1	145	21,558
		11, £1647	108, £15,284					37, £4,627								
	Army Pay and deductions on account of members of the Staff on War Service.														29	2,496
	NET TOTALS														116	19,062

* On special service leave without pay.

[ ] Means that the occupant of the post is on duty with the Field Service or *vice versa*.

† This number includes 8 members of the staff who will have passed the age-limit for superannuation by April 1, 1918, 1 absent as an officer of the R.F.C. and two mechanical assistants on special appointment.

M.O. OBSERVATORIES AT — SCHEDULE III.

Service.	Richmond.		Eskdalemuir.		Cahirciveen.		Falmouth.		Farnborough.		Benson.		Atmos. Polln.		TOTAL.		Edinburgh Office.		Auxiliary Observatories and Stations.	
	1917-18.	1918-19.	1917-18.	1918-19.	1917-18.	1918-19.	1917-18.	1918-19.	1917-18.	1918-19.	1917-18.	1918-19.	1917-18.	1918-19.	1917-18.	1918-19.	1917-18.	1918-19.	1917-18.	1918-19
EXPENDITURE.	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
Salaries (*see* Schedule II.) ...	1,817	1,588	1,060	1,376	516	589	126	180	65	411	495	383	—	100	4,079	4,627	—	—	770	770
Fixed Charges...	—	—	—	—	—	—	30	30	—	—	—	—	—	—	30	30	350	350	400	400
Rent, Rates, Taxes, Repairs and Insurance.	80	80	50	50	60	70	—	30	—	25	2	2	—	—	192	257	—	—	10	10
Cost of Forms	40	40	80	90	4	4	—	—	—	—	1	1	—	—	125	135	—	—	150	175
Fuel and Lighting	100	100	120	120	18	18	—	—	—	—	5	5	—	—	243	243	—	—	—	—
Equipment and Instruments...	100	100	100	100	50	12	50	13	50	50	100	7	—	50	450	332	—	—	—	—
Consumable Stores	25	30	30	30	6	6	2	2	20	80	30	90	—	—	113	238	—	—	—	—
Books, &c.	10	10	20	20	5	5	10	5	5	5	5	5	—	—	55	50	—	—	10	10
Incidental Expenses	25	30	15	15	5	5	13	5	5	5	5	5	—	340	68	405	—	—	60	35
Postage, Telephones and Telegrams.	40	58	40	70	20	40	45	65	100	100	25	40	—	10	270	383	—	—	50	50
Travelling and Motor Car Expenses.	2	2	65	55	—	—	20	10	25	35	5	5	—	—	117	107	25	30	—	—
Reserve Fund	—	—	—	—	—	—	—	—	—	—	300	—	—	—	300	—	—	—	—	—
TOTALS (exclusive of Salaries)	422	450	520	550	168	160	170	160	205	300	478	160	—	400	1,963	2,180	375	380	280+400	280+400
APPROPRIATIONS IN AID.																				
Subventions:—																				
Gassiot Fund ... (Royal Society.)	400	500	—	—	—	—	—	—	—	—	—	—	—	—	400	500	—	—	—	—
Parliamentary Grant (Royal Society.)	—	—	1,000	1,000	—	—	—	—	—	—	—	—	—	—	1,000	1,000	—	—	—	—
Rosse Fund ... (Royal Society.)	—	—	—	—	11	11	—	—	—	—	—	—	—	—	11	11	—	—	—	—
Advisory Committee ...	—	—	—	—	—	—	—	—	250	—	—	—	—	—	250	—	—	—	—	—
War Office	—	—	—	—	—	—	—	—	65	100	—	—	—	—	65	100	—	—	—	—
Antarctic Fund	164	—	—	—	—	—	—	—	—	—	—	—	—	—	164	—	—	—	—	—
Atmos. Pollution	—	—	—	—	—	—	—	—	—	—	—	—	—	500	—	500	—	—	—	—
Grazing Rent	4	4	—	—	17	17	—	—	—	—	—	—	—	—	21	21	—	—	—	—
Rent of Rooms	13	—	76	76	—	—	—	—	—	—	—	—	—	—	89	76	—	—	—	—
Testing Instruments and Commissions.	20	8	—	—	—	—	—	—	—	—	—	—	—	—	20	8	—	—	—	—
Other expenses refunded locally	30	30	20	20	—	—	15	15	—	—	—	—	—	—	65	65	—	—	100	130
TOTALS	631	542	1,096	1,096	28	28	15	15	315	100	—	—	—	500	2,085	2,281	—	—	100	130

It was pointed out that it had become necessary to raise the estimates for telegrams on account of the increased service despatched to the Naval Air Stations and the reports of pilot balloon ascents and indications of thunderstorms. The amount expended on salaries during the half-year had also exceeded the estimates, due to the increased war bonus and the additional staff necessary to cope with the greater amount of work, and a larger amount than last year would have to be estimated for this item.

658. Observatories.—**Eskdalemuir.**—*Substitute for Calcium Carbide.*—Reported—that on ordering the annual supply of Calcium Carbide for Eskdale Observatory it had been found necessary to procure a permit from the Ministry of Munitions. This permit had at first been refused as the use of Calcium Carbide for lighting was prohibited, but at an interview with the responsible officer at the Ministry of Munitions Major Lyons had represented that the Carbide was necessary for the continuance of autographic magnetic and seismological records for which the Observatory had been established, that owing to the isolated position of the Observatory no other means of illumination was readily obtainable, and that only a small proportion of the carbide was used for lighting purposes. A permit for four months' supply had thereupon been granted, and Major Lyons reported that he did not anticipate further difficulties to arise at the expiration of that period.

It was agreed to take no further action at present.

Dr. Chree: Report of Visit.—Submitted—the following report by Dr. C. Chree, F.R.S., Assistant Director of Obervatories :—

I arrived at Eskdalemuir Observatory on the afternoon of Monday, 3rd September, and left on the morning of the 6th, being driven from and to Lockerbie station in the Observatory motor car.

I found that some progress had been made with the proposed new scheme for drying the air admitted to the magnetograph house. It seems to be now fairly conclusively established that the damp inside the building is due mainly, if not entirely, to condensation of the moisture in the air admitted. This, at all events, is what I understood to be Dr. Crichton Mitchell's opinion. The proposed scheme looks promising on paper, assuming that the temperature of the water to pass through the condensity system proves low enough, and that the supply is sufficient. Assuming the diagnosis correct, it is clearly desirable, until a cure has been effected, to reduce to a minimum within the building all material likely to store up condensed vapour and emit it later on. With a view to this end, Dr. Mitchell has taken out the wooden flooring in the west room. The first flooring, it will be remembered, suffered from dry rot. On its removal, Dr. Hasker—who was then in charge—had a new wooden flooring put down, but in separate sections, so that it could readily be taken up and dried in the sun. It has been dried, partly at least, more than once, so the fact that it did store moisture is undoubted. Under the flooring are ordinary wooden joists, so that walking about in the room when the flooring is up is complicated. It would be a pity to take up the joists meantime, because if a cure should be effected the natural course would be to replace the wooden floor. If, however, a cure is not effected, the joists had better be removed, and some steps taken to protect the gas pipes which ordinarily are protected by the floor. For some time there has been a marked tendency to "fog" in the photographic sheets taken from the East room of the magnetograph house. In the absence of any other explanation, Dr. Mitchell was inclined to attribute this to something in the atmosphere of the room, but he was to make further experiments. In view of the facts that there is occasional loss of trace during magnetic storms from the limits of registration being exceeded, and that any manipulation of the vertical force magnet renders its records for some days to come uncertain, and the further fact that the West room is at present unused, while possessing accommodation for two magnetographs, there would obviously be an advantage in running a second magnetograph of lesser sensitiveness. For a permanent installation, it would be simplest that the two magnetographs should be of the same type—*i.e.*, both giving N and W components, or both giving declination (D) and horizontal force (H)— ; but for experimental purposes, during a limited time, an H and D magnetograph would have the advantage of supplying a check on the accuracy of the H and D diurnal irregularities, calculated at present from the N and W irregularities.

I took the opportunity of observing with the unifilar magnetometer and the dip circle. The horizontal circle of the magnetometer, the divisions on which had become very faint, was redivided recently by Mr. Dover. So far as I could judge, it is now quite satisfactory, and observing is very much less trying to the eyes than it was a year ago. At the same time the illumination of the circle from the roof light leaves something to be desired. The dip circle has been replaced for routine work by the dip inductor. It should, however, be remembered that the latter is of German construction, and if anything happened to it or the galvanometer which is used with it, there might be difficulty in getting repairs satisfactorily executed within a reasonable time. Thus there is at least a possibility that the dip circle may have to be used again to fill a gap. It seemed to be in good working order, and the results which I obtained with it differed but little from those obtained simultaneously by Mr. Skelton using the dip inductor. I found that a somewhat clumsy lead weight introduced by Dr. Hasker was still being used as a counterpoise to the magnet with its carriage and thermometer during the deflection experiment, and suggested that the addition of a small weight to the original counterpoise supplied by Mr. Dover would enable it to be used, thus improving the appearance of the instrument.

After the war I think the position of the electrograph should be reconsidered. Where it is now situated, the jet is rather a nuisance. If circumstances allow, it would certainly be desirable, when a

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new site is selected, to run electrographs in the two sites for some time, to secure an overlap of records. At present our ideas are very vague as to the effects to be expected from change of site in any instrument recording the electric properties of the atmosphere.

I learned from Dr. Mitchell that the Observatory does not at present possess a standard thermometer, and I advised him to apply for one.

I also suggested the construction in the Observatory workshop of an ice point apparatus, because opportunities for using it at Eskdalemuir will in the natural course be not infrequent, and it affords the simplest and most exact way of determining zero changes in thermometers.

Dr. Mitchell expressed some doubt about the indications of air transmitted by the Ebert instrument—which does not possess a dial—and we provisionally arranged that if an opportunity offered he should send it to Kew Observatory for a comparison with the instrument there, which was compared recently at the National Physical Laboratory.

The Observatory had had the advantages of the services of Dr. J. R. Milne during the holiday season at Edinburgh University, and the work generally seemed satisfactorily in hand.

The curtailment of transport evidently introduces serious difficulty into catering for the wants of the Observatory and the staff, and there seems no immediate prospect of any improvement in this direction but rather the reverse.

Temporary Employment of Dr. Milne.—Reported—that Dr. J. R. Milne had attended at the Eskdale Observatory from 8th July to 7th September, 1917, to render assistance during the summer months.

Approved.

Eskdalemuir and Valencia.—*Lightning Recorders.*—Reported—that for the effectual carrying out of the thunderstorm inquiry it had been found necessary to provide additional installations at Eskdale and Valencia, and authorisation was required for the expenditure of approximately £500, the estimated cost of the apparatus required at the two Observatories.

Approved.

659. Meteorological Section, R.E.—**Appreciation of Forecasts.**—Reported—the receipt by the Commandant of the Meteorological Section, G.H.Q., France, of the following telegram from the Headquarters of the Second Army :—

" Many thanks for your correct forecasts which were of great assistance to us."

Visit of Major Lyons.—Reported—that Major Lyons had paid a visit of inspection to the Meteorological Section R.E. in France on 5th to 11th September, and had found that the working of the Section was satisfactory.

Increased Establishment.—Reported—that by letter 5799/CM. 10, dated the 21st August, 1917, the Army Council had approved of an increase of establishment of the Meteorological Section, R.E., France, which is now as folllows :—

Detail.	G.H.Q.	Total for 5 Armies.	Grand Total.	Increase.
Commandant	1	—	1	—
Captains	1	5	6	4
Subalterns	2	5	7	2
Serjeant-Major	1	—	1	—
Serjeants	—	5	5	2
Clerk	1	—	1	—
Corporals	2	25	27	1
Pioneers	2	30	32	26
Total (excluding attached) ...	10	70	80	35
Attached:—				
Bâtmen (*a*)	3	5	8	—
Driver A.S.C.	1	—	1	—
Total (including attached) ...	14	75	89	35

(*a*) P.B. Details.

TRANSPORT.

Detail.	Vehicles.	Drivers.	Increase.
Motor Car	1	1 (*b*)	—
Motor Cycles	3	—	—
Bicycles	12	—	10
Total	16	1	10

(*b*) Provided by the A.S.C.

Home Station (Minute 648).—*Reports of Work.*—Reported—the receipt of Reports of Work from the Meteorological Section, R.E., at Chapperton Down, for the months of July, August and September.

660. STATIONS.—**Hartland Point.**—Reported—the establishment of a voluntary telegraphic reporting station at Hartland Quay in charge of Mr. Harold Notley, who acted as Voluntary Assistant at Kew Observatory in 1915 (Minute 533). Instruments had been lent by the Office, and telegrams had been received since 31st July.

Oxford, Radcliffe Observatory.—Reported—that following the letter printed in Minute 629, a cheque, value £2, had been sent to the Radcliffe Observatory as the quarterly instalment of the payment for observations contributed to the Weekly Weather Report.

Reported further—the receipt of letter 1780/S.3 from the Radcliffe Observatory, stating that they would prefer the payment for observations contributed to be discontinued altogether, and returning the cheque sent. They would be pleased to continue the returns for the Weekly and Monthly Reports. A letter acknowledging the cheque had been sent.

It was agreed to send a letter of thanks to the Radcliffe Observatory.

Inspections during 1917.—Reported—that upwards of 50 stations, chiefly comprising Health Resorts and Telegraphic Reporting Stations had been inspected by the Professional Staff during the summer months.

Approved.

661. INSTRUMENTS.—**Instruments on charge on 8th August, 1917.**—Reported—that in accordance with Minute 640 a number of instruments which were no longer of M.O. pattern, or were otherwise unsuitable for issue, had been sold by auction on 13th August, and that the amount realised by the sale was £8 14*s.*, of which £2 16*s.* was credited to the Admiralty account.

Reported further—that loans of instruments of historical interest had been made to the Science Museum, and to the Free Public Library and Museum, Preston. Other loans were in contemplation.

Reported further—that Major Lyons had made a complete stocktaking of instruments on charge on 8th August, excluding all instruments in use in the Office, at the observatories and stations, and on board ship, of which separate revised lists were being made. Owing to the fact that certain instruments on charge had not hitherto been brought to account, the stock included a number of items which were not shown in the stock ledger, as follows :—

Thermometers,	−20 to †90, Faht. ...	1	
,,	−90 to †80	3	
,,	−40 to 120	1	
,,	−30 to 90	1	
,,	−70	2	
,,	−70 to 120	7	
,,	−40 to 60	11	
,,	−60 to †60 low range min.	15	
,,	−60 to †60 low range max.	3	
Thermometers, Commonwealth	max.	1	
,, ,,	min.	1	
,, ,,	ordinary	1	
Lightning Recorder Buzzers		4	
Canvas Buckets		17	
Batteries for Electric Lamps		7	
Glass Shades for M.M. Barometers ...		1	
Brackets ,, ,, ,, ...		30	
Arms (long) ,, ,, ,, ...		39	
,, (short) ,, ,, ,, ...		4	
Sunshine Recorder Spheres		33	

Sunshine Recorder Testers	1	Bottles, 2 oz.	24
„ „ focussing frames...	1	„ 1 oz.	14
Gauges for SS Recorder Sphere ...	2	Pens for Barographs	33
Cards for testing SS Recorder ...	1 set	Boxes, thermometer	37
Templates for SS cards	1	Mounts „	172
Gauge Barometers	2	Candles	—
Tubes for Earth Thermometers, 4 ft....	3	Cases for Slide Rules	5
„ „ „ 2 ft....	1	Raingauges, Marine	8
„ „ „ 1 ft....	6	„ „ Jars for	5
Hyetographs	2	Tapes, measuring	2
„ Pens for...	36	Gauges for Raingauges	1
Hydrometers	79	Spirit-levels, Masons	2
„ Jars	11	Wireless operator sets...	1
Eidographs	2	Asbestos	3 sheets
Meteorographs, Assmann	1	Coherers, Marconi	1
Water Bottles	121	Anemometer tools	2 sets

Authority for taking these on charge is required.

Reported—that the following discrepancies are shown between the stock ledger and the stock on 8th August :—

Item.	Stock in excess of ledger.	Stock in defect of ledger.
Solar Max. Thermometers ...	4	
Ord. Absolute „ ...	1	
Raingauge Glasses 8″ (inch) ...	3	
Nephoscopes, Fineman		2
Scales		3
Altazimuths		2
Thermometers (Admiralty) Ord....		2
„ „ Max....		4
„ „ Min....		5
Theodolites	2	
Clocks, Lightning Recorder ...	8	
Wire for Electric Anemometers ...		818 yds.

Authority for making the necessary adjustment in the stock ledger is required.

Approved.

Proposed arrangement for dealing with supplies to the Navy.—Reported—that in accordance with Minute 640 the Office had been in communication with the Admiralty, and that a representative of the Director of Stores had had a conference with Major Lyons and the Superintendent of Instruments. A report of the conference had been circulated to the Committee for approval. Under the proposed arrangement the Office would act as contractors, undertaking to keep a specified establishment at the Office which could be drawn upon by the Naval Yards, and charging 5 per cent. Departmental Expenses. The Admiralty would pay for instruments received and be credited for returns, repaired instruments being charged out as new. Breakages would be covered by insurance. The Office would thus be enabled to place orders for, say, a year's supply in advance, and draw upon the stocks at their disposal, instead of keeping separate stocks and accounts for the Admiralty.

It was agreed to ascertain the views of the Treasury upon the subject.

Barographs for Air Board.—Reported—the receipt of an order from the Director-General of Military Aeronautics for 600 barographs reading to 28,000 feet. The supply was required within six months. It was proposed to have these instruments manufactured under the superintendence of Mr. W. H. Dines, of Benson Observatory, and Mr. Dines had been asked to submit a suitable design.

Approved.

662. ADVISORY COMMITTEE ON ATMOSPHERIC POLLUTION.—Reported—the following statement of account to 24th October, 1917 :—

Receipts.				*Payments.*			
1917.	£	s.	d.	1917.	£	s.	d.
April 2. Grant	500	0	0	Salaries	50	0	0
				Furniture, fittings, &c. ...	10	0	0
				Expenses (47 Victoria St.) (including clerical work)	38	17	9
				Expenses, M.O.	0	18	0
					99	15	9
				Balance	400	4	3
	£500	0	0		£500	0	0

New Members.—Reported—that in accordance with Minute 629, the following members had been appointed by the authorities contributing observations :—

Dr. John Robertson,	nominated by the Corporation of	Birmingham.
Dr. W. Hanna,	,, ,, ,,	Liverpool.
Dr. W. J. Howarth	,, ,, ,,	the City of London.
Mr. Henry Mills, J.P.	,, ,,	London County Council.
Mr. W. Osborne Thorp,	,, ,,	Corporation of Malvern.
Professor W. Haldane Gee,	,, ,, ,,	Manchester.
Mr. C. T. Stableforth, J.P.,	,, ,, ,,	Newcastle-upon-Tyne
Dr. J. B. Wilkinson,	,, ,, ,,	Oldham.
Dr. J. R. Ashworth,	,, ,, ,,	Rochdale.
Dr. Cates,	,, ,, ,,	St. Helens.
Mr. John Fyfe,	,, ,, ,,	Stirling.

The Department of Scientific and Industrial Research had appointed Mr. W. S. Curphey to serve on the Committee.

Approved.

663. DIRECTOR'S REPORT & ACCOUNTS.—**Summer Time Arrangements during 1917.**—Reported—that the operation of the Summer Time Act, 1917, had necessitated some modifications in the work of the Forecast Division, including the compilation and despatch of the Daily Weather Report, which it was not possible to prepare in time for the mid-day post. This difficulty had been overcome as far as possible by the preparation of special reports and advance copies, and by the extended use of the Express Railway Letter Service in cases where it was possible to reach the recipients by this means. The hours of attendance of the Forecast Division and the times of observations taken in the Office had been regulated by G.M.T ; Summer Time being adopted for the remainder of the Office work. As far as possible G.M.T. had been retained for the observations reported to the Office, but some observers had found it impossible to effect the necessary change, and the records from such stations had thus lost their continuity. Information from Health Resorts communicated to the Press had been supplied at Summer Time.

Harvest Forecast Arrangements during 1917.—Reported—that the procedure with regard to Harvest Forecasts had been the same as that authorised last year (Minute 584), and that 24-hour forecasts had been supplied to farmers and landowners after due inquiry had been made as to the legitimacy of their applications.

Original Papers.—*Mr. L. F. Richardson.—Weather Prediction by Means of Finite Differences* (Minute 581).—Reported—that a paper on the above subject had been submitted by Mr. L. F. Richardson, formerly superintendent of the Eskdale Observatory. The Director had forwarded the manuscript to the Royal Society, who had replied that they considered it more suitable for publication in book form than in the "Proceedings of the Royal Society," and had promised a contribution of £100 towards the expenses of publication. The manuscript had now been sent to the Cambridge University Press, who had submitted an estimate of the cost of publication ; and Mr. Richardson had been authorised to make a contract direct with the University Press.

Mr. E. G. Bilham.—*The effect of variations of barometric pressure upon the water-level of the well at Kew Observatory.*—Reported—that Mr. E. G. Bilham, B.Sc., Professional Assistant, had submitted a memorandum on the above subject. Upon the recommendation of Dr. Chree, the Director had forwarded the manuscript to the Royal Society, and had been informed that they would accept it for publication.

Mr. R. G. K. Lempfert.—*Permission to write a book on Meteorology.*—Reported—that Mr. Lempfert, Superintendent of the Forecast Division, had received a request from Messrs. Methuen & Co., Ltd., to write a book on Meteorology of some 50,000 words, to replace a similar book by Dr. H. N. Dickson, now out of print. Mr. Lempfert had received the Director's permission to undertake the work and to make reproductions of the Office blocks and diagrams for illustrations (subject to the approval of the Controller of the Stationery Office in the case of blocks in the possession of that Department).

Mr. R. A. W. Watt.—*Patent of a Unidirectional goniometer.*—Reported—that Mr. R. A. W. Watt, Meteorologist-in-Charge of the Branch Office at South Farnborough, had invented a new design for a unidirectional goniometer, and had asked that it might be protected on behalf of the Office under a secret patent during the war. Permission had been given, and Mr. Watt had filed a provisional specification.

Approved.

Civil Aerial Transport Committee.—Reported—that Major Lyons had consented to serve on Sub-Committee No. 2, dealing with Aerial Routes ; and that Major G. I. Taylor was serving on the same Sub-Committee and also on Sub-Committee No. 7, on Education and Scientific Research.

Accounts.—Submitted—the following Statement of the Bank Account in the Cash Book :—

	£	s.	d.
Balance on 26th June, 1917	2,618	3	2
Receipts from 27th June to 23rd October, 1917	17,495	18	9
	20,114	1	11
Cheques drawn from 27th June to 23rd October, 1917	13,449	10	9
Balance on 23rd October, 1917	£6,664	11	2

Submitted—The following Statement of Accounts for the three months ended 30th June, 1917, prepared for audit by the Comptroller and Auditor-General:—

RECEIPTS.								PAYMENTS.					
1916.					1917.			1916.					1917.
£	s.	d.		£	s.	d.	£	s.	d.		£	s.	d.	£	s.	d.
2,208	15	5	Balance from year 1916-17	—			2,047	13	5	250	0	0	Director...	—			250	0	0
5,625	0	0	Parliamentary vote..	—			5,625	0	0				OFFICE SALARIES (including Insurance):						
										2,362	6	5	Monthly	2,601	6	10			
										359	18	10	Weekly	446	5	3			
			DEPARTMENTAL EXPENSES REPAID:														3,047	12	1
	14	6	Forecasts, &c. ...	11	0								EXPENSES OF OFFICE:						
16	19	5	Marine, Statistical, and Administrative	16	7	8				171	10	9	Rent, Heating, and Lighting	172	6	5			
										44	4	9	Furniture and Equipment	11	3	0			
6	14	10	Instruments ...	29	19	10				9	14	9	Library	9	17	10			
							46	18	6	3	15	0	Insurances and Repairs	3	3	9			
			INCIDENTAL EXPENSES REPAID:							62	14	8	Incidental Expenses, and Consumable Stores	34	5	5			
20	6	1	D.W. Report ...	18	6	3													
20	1	4	Divisional... ...	14	1	6													
			Advertising Account							1	17	6	Advertising Account ...	—					
1	0	2		2	0	10													
							34	8	7				POST OFFICE:				230	16	5
										183	1	11	Postage	177	3	6			
9	4	3	STATIONERY OFFICE	—			24	14	11	90	15	8	Telephones	96	0	7			
										718	9	11	Telegrams	1,037	15	9			
			TELEGRAPH														1,310	19	10
89	5	7	CHARGES REPAID	—			219	0	11	70	1	5	STATIONERY OFFICE ..	—			64	1	4
										11	10	11	TRAVELLING EXPENSES	—			2	2	0
			TELEPHONE										SUPERANNUATION:						
	4	0	CHARGES REPAID	—				5	3				Pensions not chargeable on Fund ...	6	5	0			
—			INSPECTIONS ...	—			6	9	6	92	18	4	Pensions chargeable on Fund	68	18	0			
										68	18	0							
			INSTRUMENTS:							140	12	6	Annuities	140	12	6			
10	5	6	Royal Navy ...	—						—			Contribution to fund	—					
284	15	4	By sales from Stock	900	12	3											215	15	6
							900	12	3	950	17	5	COST OF INSTRUMENTS: Royal Navy	1,052	19	8			
			SUPERANNUATION ACCOUNT:							68	19	2	For Stock ...						
151	17	6	Annuities... ...	140	12	6				1,327	18	7	Other Commissions	1,520	9	0			
15	19	5	Interest on Investments	21	1	1											2,573	8	8
							161	13	7				*OBSERVATORIES, BRANCHES, AND STATIONS:						
			*OBSERVATORIES, BRANCHES, AND STATIONS:							602	15	11	Richmond	578	16	11			
										321	14	0	Eskdalemuir	325	14	7			
283	8	11	Richmond... ...	57	7	9				177	9	8	Cahirciveen	180	7	9			
506	10	3	Eskdalemuir ...	504	14	6				78	1	10	Farnborough	72	1	5			
8	15	0	Cahirciveen ...	8	6	6				71	0	11	Falmouth	72	15	5			
256	13	9	Farnborough ...	266	8	3				107	13	8	Benson	140	17	5			
4	14	7	Falmouth... ...	3	10	10				—			Atmos. Pollution ...	25	0	0			
10	0	0	Benson	—						99	6	6	Edinburgh	102	2	3			
—			Atmos. Pollution..	500	0	0				293	7	2	Miscellaneous ...	299	0	1			
—			Edinburgh ...	—													1,796	15	10
26	17	9	Miscellaneous ...	43	2	6											9,491	11	8
							1,383	10	4				†LESS WAR LOAN SUBSCRIPTIONS ...	—			97	4	0
							10,450	7	3								9,394	7	8
			Less War Loan subscriptions included in balance on 1st April, 1917 ...	—			97	16	0				BALANCE:						
—										748	8	2	Cash at Bank... ...	885	11	9			
										67	19	3	„ at Office ...	72	11	10			
																	958	3	7
£9,558	3	7					£10,352	11	3	£9,558	3	7					£10,352	11	3

* For details, *see* separate statement. † Deductions from Salaries during June; lodged with Bank on July 6th.

Statement of Assets and Liabilities at 30th June, 1917.

LIABILITIES.							ASSETS.					
£	s.	d.		£	s.	d.	£	s.	d.		£	s. d.
3,444	1	5	To sundry creditors	4,305	18	11	816	7	5	By cash at Bank and at Office ...	958	3 7
64	8	6	„ superannuation	120	18	6	23	18	2	„ salaries reserved (premiums) ...	23	18 2
2,017	5	1	„ balance	2,245	17	7	839	19	2	„ M.O. instruments in stock	1,104	2 11
							1,002	14	6	„ sundry debtors	2,404	17 11
							2,842	15	9	„ Admiralty	2,181	12 5
£5,525	15	0		£6,672	15	0	£5,525	15	0		£6,672	15 0

NOTE.—On 30th June the amount of Government securities held for the provision of Superannuation Annuities was £26 14s. 2d. 2½ per cent. Consols, and £989 9s. 6d. 5 per cent. War Loan.

Observatories.—Statement of Accounts for the three months ended 30th June, 1917 :—

RICHMOND.

1916. £ s. d.	*Receipts.*	£ s. d.	£ s. d.	1917. £ s. d.	1916. £ s. d.	*Payments.*	£ s. d.	£ s. d.	1917. £ s. d.
41 0 0	Subvention, Scott Antarctic Fund	41 0 0			455 8 9	Salaries, Scheduled	456 16 10		
194 5 2	Gassiot Trust				13 2 1	Sunday and holiday duty	20 12 6		
			41 0 0					477 9 4	
48 3 9	Expenses refunded locally ...		2 16 0		13 0 6	Cost of forms, &c.		9 18 6	
—	Tests and Commissions		—		49 9 7	Rent, Rates, Taxes, Repairs and Insurance		12 16 6	
—	Cost of books and forms refunded		13 11 9						
319 7 0	Balance		521 9 2		23 8 1	Fuel and lighting		28 17 8	
					20 10 4	Equipment and instruments ...		6 14 2	
					5 5 4	Consumable stores		8 10 8	
					7 2 0	Incidental expenses		6 12 9	
					2 2 2	Books, &c.		2 14 0	
					13 2 8	Postage, telephones and telegrams		25 3 4	
					4 5	Travelling expenses		—	
£602 15 11			£578 16 11		£602 15 11			£578 16 11	

ESKDALEMUIR.

£ s. d.		£ s. d.	£ s. d.	£ s. d.		£ s. d.	£ s. d.
500 0 0	Subvention, Royal Society ...	500 0 0	225 19 3	Salaries, Scheduled		239 4 8	
6 10 3	Expenses refunded locally ...	4 14 6	21 18 3	Cost of forms, &c.		22 1 5	
—	Balance	—	3 1 6	Rent, Rates, Taxes, Repairs and Insurance		13 0 7	
			6 7 6	Fuel and lighting		2 10 0	
			13 9 2	Equipment and instruments ...		—	
			5 19 11	Consumable stores...		7 5 2	
			3 7 6	Incidental expenses		1 11 9	
			2 2 9	Books, &c.		2 12 0	
			27 7 10	Postage, telephones and telegrams		28 18 5	
			12 0 4	Travelling and motor car expenses		8 10 7	
			184 16 3	Balance		178 19 11	
£506 10 3		£504 14 6	£506 10 3			£504 14 6	

CAHIRCIVEEN.

£ s. d.		£ s. d.	£ s. d.		£ s. d.	£ s. d.
—	Subventions (Rosse Fund) ...	—	127 16 2	Salaries, Scheduled	131 5 0	
8 15 0	Expenses refunded locally ...	8 6 6	—	Cost of forms	—	
168 14 8	Balance	172 1 3	26 9 10	Rent, Rates, Taxes, Repairs and Insurance	20 1 6	
			5 2 2	Fuel and lighting	6 17 0	
			2 5 0	Equipment and instruments ...	3 7 10	
			11 4	Consumable stores	2 6 11	
			8 11	Incidental expenses	1 10 2	
			1 8 0	Books, &c.	1 8 0	
			13 8 3	Postage, telephones and telegrams	13 11 4	
			—	Travelling expenses	—	
£177 9 8		£180 7 9	£177 9 8		£180 7 9	

FARNBOROUGH BRANCH OFFICE.

£ s. d.		£ s. d.	£ s. d.		£ s. d.	£ s. d.
250 0 0	Subvention (Advisory Committee for Aeronautics)	250 0 0	8 5 9	Salaries, Scheduled	24 18 3	
			—	Overtime, &c.	—	
6 13 9	Expenses refunded (War Office) ...	16 8 3	—	Cost of forms	—	
—	Balance	—	—	Rent, Rates, Taxes, Repairs and Insurance	6 4	
			—	Fuel and lighting	—	
			34 9 5	Equipment and instruments ...	16 9 5	
			7 7 8	Consumable stores...	3 16 4	
			18 8	Incidental expenses	—	
			1 8 0	Books, &c.	1 8 0	
			25 12 4	Postage, telephones and telegrams	14 6 8	
			—	Travelling and motor car expenses	10 16 5	
			178 11 11	Balance	194 6 10	
£256 13 9		£266 8 3	£256 13 9		£266 8 3	

FALMOUTH WEATHER STATION.

£ s. d.		£ s. d.	£ s. d.		£ s. d.	£ s. d.
4 14 7	Expenses refunded locally... ...	3 10 10	15 0 0	R. Cornwall Polytechnic Society	15 0 0	
66 6 4	Balance	69 4 7	29 5 6	Salaries, Scheduled	44 0 3	
			—	,, Additional	—	
			—	Rent, Rates, Taxes, Repairs and Insurance	—	
			1 7 2	Equipment and instruments ...	—	
			3 11	Consumable stores	—	
			1 11	Incidental expenses	13 1	
			18 13 8	Postage, telephones and telegrams	12 19 1	
			6 8 9	Travelling expenses	3 0	
£71 0 11		£72 15 5	£71 0 11		£72 15 5	

ADV. COM. ATMOS. POLLUTION.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
—	Subventions	500 0 0	—	Salaries scheduled	25 0 0
			—	Balance	475 0 0
£ —		£500 0 0	£ —		£500 0 0

BENSON.

1916.	*Receipts.*	1917.	1916.	*Payments.*	1917.
£ s. d.		£ s. d.	£ s. d.		£ s. d.
10 0 0	Expenses refunded locally ...	—	85 3 3	Salaries, Scheduled...	106 2 0
97 13 8	Balance	140 17 5	—	Overtime, &c.	1 15 6
			—	Cost of forms, &c.	—
			—	Rent, Rates, Taxes, Repairs and Insurance	—
			1 0 0	Fuel and Lighting	3 5 0
			5 0	Equipment and instruments ...	—
			5 5 11	Consumable stores	6 16 11
			1 9 6	Incidental expenses	1 5 4
			—	Books, &c.	10 6
			12 9 0	Postage, telephones and telegrams	21 4 2
			2 1 0	Travelling expenses	—
£107 13 8		£140 17 5	£107 13 8		£140 17 5

METEOROLOGICAL OFFICE, EDINBURGH.

£ s. d.		£ s. d.	£ s. d.		£ s. d
99 6 6	Balance	102 2 3	87 10 0	Snbvention	87 10 0
			11 16 6	Travelling expenses	14 12 3
£99 6 6		£102 2 3	£99 6 6		£102 2 3

MISCELLANEOUS STATIONS.

£ s. d.		£ s. d.	£ s. d.		£ s. d.	£ s. d.
26 17 9	Cost of forms refunded	43 2 6	86 2 6	Subventions : Aberdeen, Armagh ...	86 2 6	
266 9 5	Baiance	255 17 7	—	British Rainfall Organization	—	
						86 2 6
			160 12 0	Salaries of Observers (36) ...		164 3 0
			—	Overtime, &c.		—
			—	Cost of forms, &c.		27 7 6
			2 12 6	Rent, Rates, Taxes, Repairs and Insurance		1 13 5
			—	Fuel and Lighting		1 0 9
			6 18 9	Equipment and instruments ...		—
			19 6	Consumable stores		—
			11 2 1	Agents' fees, &c.		2 15 4
			1 5 0	Books, &c.		5 7
			23 14 10	Postage, telephones and telegrams		15 12 0
£293 7 2		£299 0 1	£293 7 2			£299 0 1

METEOROLOGICAL FIELD SERVICE.

FRANCE.

£ s. d.		£ s. d.	£ s. d.		£ s. d.	£ s. d.
—	War Office	137 5 10		Salaries :		
102 10 8	Balance	345 5 10	—	Major E. Gold ...	12 10 0	
			3 10 10	Capt. A. H. R. Goldie	—	
			—	Lieut. E. H. Chapman	—	
			—	Lieut. F. Entwistle	—	
			6 18 11	Sergt. R. Pyser ...	11 4 5	
			5 17 0	Corpl. E. L. Clinch	8 9 0	
			11 13 4	Corpl. A. G. Goad ...	17 13 10	
			—	Corpl. C. F. J. Jestico	8 13 8	
			—	Corpl. R. M. Poulter	8 9 0	
					66 19 11	
			—	Cr.—Amounts refunded	—	
						66 19 11
			—	Salaries : Overtime		—
				Incidental Expenses :		
			4 14 11	Postage	6 19 1	
			—	Telegrams ...	—	
			—	Printed books ...	—	
			9 0	Miscellaneous ...	—	
						6 19 1
			69 6 8	Instruments		408 12 8
£102 10 8		£482 11 8	£102 10 8			£482 11 8

DARDANELLES.

£ s. d		£ s. d.	£ s. d.		£ s. d.	£ s. d.
79 11 1	Admiralty	211 16 8		Salaries :		
180 18 3	War Office	81 7 9	—	Capt. E. M. Wedderburn	—	
192 10 6	Balance	352 3 3	—	Corpl. C. V. Ockenden	7 9 6	
						7 9 6
			14 18 9	Salaries : Overtime		—
				Incidental Expenses :		
			1 13 8	Postage	6 10 0	
			244 0 10	Telegrams ...	556 13 1	
			—	Printed books ...	—	
			—	Typewriter ...	—	
			1 11 8	Miscellaneous ...	—	
						563 3 1
			190 14 11	Instruments		74 15 1
						£645 7 8
£452 19 10		£645 7 8	£452 19 10			

Submitted—The following Statement of Accounts for the six months ended 30th September, 1917, prepared for audit by the Comptroller and Auditor-General :—

RECEIPTS.						PAYMENTS.			
1916. £ s. d.		£ s. d.	1917. £ s. d.		1916. £ s. d.		£ s. d.	1917. £ s. d.	
2,208 15 5	Balance from year 1916–17	—	2,047 13 5		500 0 0	Director	—	500 0 0	
11,250 0 0	Parliamentary vote.	—	11,250 0 0			OFFICE SALARIES (including Insurance) :			
	DEPARTMENTAL EXPENSES REPAID :				4,652 19 10	Monthly	5,629 2 7		
					779 16 10	Weekly	1,020 14 10		
1 14 0	Forecasts, &c. ...	1 4 6						6,649 17 5	
29 7 2	Marine, Statistical, and Administrative	32 19 8				EXPENSES OF OFFICE:			
					343 5 10	Rent, Heating, and Lighting ...	345 0 0		
35 10 2	Instruments ...	152 15 9				Furniture and Equipment			
			186 19 11		81 11 10		28 6 3		
	INCIDENTAL EXPENSES REPAID :				14 7 10	Library	12 19 9		
					3 15 0	Insurances, Repairs...	3 3 9		
36 16 1	D.W. Report ...	32 6 1			129 4 4	Incidental Expenses and Consumable Stores	69 3 11		
46 5 3	Divisional... ...	35 18 7							
2 11 8	Advertising Account	4 8 1			3 15 0	Advertising Account...	3 15 0		
			72 12 9					462 8 8	
						POST OFFICE :			
					373 1 4	Postage	388 7 9		
					91 11 6	Telephones	99 1 7		
21 14 7	STATIONERY OFFICE	—	41 13 3		1,213 9 8	Telegrams	2,048 15 10		
								2,536 5 2	
	TELEGRAPH								
142 17 9	CHARGES REPAID	—	1,608 2 5		70 1 5	STATIONERY OFFICE...	—	64 1 4	
					103 17 1	TRAVELLING EXPENSES	—	82 10 1	
	TELEPHONE								
16 4	CHARGES REPAID	—	1 6 3			SUPERANNUATION :			
						Pensions not chargeable on Fund ...	12 10 0		
76 0 0	INSPECTIONS ...	—	94 9 6		99 3 4				
						Pensions chargeable on Fund	137 16 0		
	INSTRUMENTS :				137 16 0				
2,011 0 0	Royal Navy ...	1,985 15 4			281 5 0	Annuities	281 5 0		
	Mercantile Marine.								
369 14 2	Stations, &c. ...	2,314 5 2			—	Contribution to fund.	—		
			4,300 0 6					431 11 0	
	SUPERANNUATION ACCOUNT :					COST OF INSTRUMENTS:			
					2,011 17 6	Royal Navy	1,992 16 4		
292 10 0	Annuities	281 5 0			93 0 7	For Office use			
	Interest on Investments				2,790 3 0	Other Commissions }	3,290 13 3		
16 2 9		21 4 5							
			302 9 5					5,283 9 7	
	*OBSERVATORIES, BRANCHES, AND STATIONS :					*OBSERVATORIES, BRANCHES, AND STATIONS :			
291 8 6	Richmond ...	331 19 6			1,090 15 8	Richmond	1,146 9 9		
514 5 3	Eskdalemuir ...	510 15 3			908 4 8	Eskdalemuir	736 2 0		
8 15 0	Cahirciveen ...	9 6 6			321 7 4	Cahirciveen	354 2 2		
256 13 9	Farnborough ...	266 8 3			402 8 2	Farnborough ...	231 1 8		
7 0 8	Falmouth... ...	8 6 11			115 11 9	Falmouth	180 5 2		
10 0 0	Benson	—			230 13 7	Benson	313 11 1		
—	Atmos. Pollution...	500 0 0			—	Atmos. Pollution ...	69 16 5		
—	Edinburgh ...	—			186 16 6	Edinburgh	189 12 3		
48 12 3	Miscellaneous ...	63 0 11			607 0 4	Miscellaneous ...	597 15 2		
			1,689 17 4					3,818 15 8	
								19,828 18 11	
17 17 10	To Balance	—	—			†LESS WAR LOAN SUBSCRIPTIONS ...	—	97 0 0	
			21,595 14 9					19,731 18 11	
	Less War Loan Subscriptions included in balance on 1st April, 1917 ...	97 16 0			—	BALANCE : Cash at Bank ...	1,680 6 11		
—					52 7 8	,, at Office ...	89 8 11		
	Add unexpended subscription (Poulter)	3 16 0				Advance for travelling Expenses ...	—		
			94 0 0		7 0 0			1,769 15 10	
£17,696 8 7			£21,501 14 9		£17,696 8 7			£21,501 14 9	

* For details, see separate statement. † Deductions from Salaries during September ; lodged with Bank on October 5th.

Statement of Assets and Liabilities at 30th September, 1917.

LIABILITIES.				ASSETS.			
£ s. d.		£ s. d.	£ s. d.		£ s. d.		£ s. d.
17 17 10	To Bank of England	—	52 7 8	By cash at Bank and at Office ...		1,769 15 10	
3,579 8 7	,, sundry creditors	3,734 1 5	16 8 2	,, salaries reserved (premiums) ...		16 8 2	
122 18 6	,, superannuation	239 8 6	741 14 9	,, M.O. instruments in stock ...		2,292 9 0	
1,937 2 2	,, balance	3,477 0 6	1,820 2 3	,, sundry debtors		1,641 6 8	
			3,026 14 3	,, Admiralty		1,730 10 9	
£5,657 7 1		£7,450 10 5	£5,657 7 1			£7,450 10 5	

NOTE.—On 30th September the amount of Government securities held for the provision of Superannuation Annuities was £26 14*s.* 2*d.* 2½ per cent. Consols, and £989 9*s.* 6*d.* 5 per cent. War Loan.

Observatories.—Statement of Accounts for the Six months ended 30th September, 1917.

Richmond.

1916.	Receipts.			1917.			1916.	Payments.			1917.		
£ s. d.		£ s. d.		£ s. d.			£ s. d.		£ s. d.		£ s. d.		
41 0 0	Subvention, Scott Antarctic Fund	82 0 0					857 15 3	Salaries, Scheduled...	966 19 7				
194 5 2	Gassiot Trust	225 12 2					20 10 7	Sunday and holiday duty	28 1 9				
			307 12 2							995 1 4			
48 3 9	Expenses refunded locally ...		2 16 0				16 13 4	Cost of forms, &c.		13 10 10			
3 3 7	Tests and Commissions		3 3 7				59 6 1	Rent, Rates, Taxes, Repairs and Insurance		20 3 0			
4 16 0	Cost of books and forms refunded		18 7 9				38 3 8	Fuel and lighting		47 3 5			
799 7 2	Balance		814 10 3				52 4 10	Equipment and instruments ...		21 3 9			
							11 12 9	Consumable stores		10 8 5			
							9 15 10	Incidental expenses		8 12 7			
							2 10 8	Books, &c.		2 14 0			
							21 18 3	Postage, telephones and telegrams		27 12 5			
							4 5	Travelling expenses		—			
£1,090 15 8			£1,146 9 9				£1,090 15 8			£1,146 9 9			

Eskdalemuir.

£ s. d.		£ s. d.		£ s. d.		£ s. d.	
500 0 0	Subvention, Royal Society ...	500 0 0	520 3 0	Salaries, Scheduled ...	575 6 3		
14 5 8	Expenses refunded locally ...	10 15 3	43 19 0	Cost of forms, &c	43 15 8		
393 19 0	Balance	225 6 9	3 1 6	Rent, Rates, Taxes, Repairs and Insurance	13 0 7		
			23 3 11	Fuel and lighting	24 2 9		
			17 12 6	Equipment and instruments ...	2 9 6		
			15 2 11	Consumable stores...	11 2 6		
			5 13 9	Incidental expenses	2 6 9		
			2 2 9	Books, &c.	3 9 0		
			31 19 9	Postage, telephones and telegrams	32 13 2		
			245 5 7	Travelling and motor car expenses	27 15 10		
£908 4 8		£736 2 0	£908 4 8		£736 2 0		

Cahirciveen.

£ s. d.		£ s. d.		£ s. d.		£ s. d.	
—	Subventions (Rosse Fund) ...	—	258 4 2	Salaries, Scheduled	276 3 8		
8 15 0	Expenses refunded locally ...	9 6 6	2 9 10	Cost of forms	—		
312 12 4	Balance	344 15 8	32 13 9	Rent, Rates, Taxes, Repairs and Insurance	35 18 11		
			7 6 2	Fuel and lighting	9 5 0		
			3 9 11	Equipment and instruments ...	8 1 10		
			1 11 0	Consumable stores	2 6 11		
			8 11	Incidental expenses	1 14 3		
			1 8 0	Books, &c.	1 8 0		
			13 15 7	Postage, telephones and telegrams	19 3 7		
			—	Travelling expenses	—		
£321 7 4		£354 2 2	£321 7 4		£354 2 2		

Farnborough Branch Office.

£ s. d.		£ s. d.		£ s. d.		£ s. d.	
250 0 0	Subvention (Advisory Committee for Aeronautics)	250 0 0	17 4 0	Salaries, Scheduled	81 17 6		
6 13 9	Expenses refunded (War Office) ...	16 8 3	—	Cost of Forms	3 0		
145 14 5	Balance	—	—	Rent, Rates, Taxes, Repairs and Insurance	12 6 4		
			341 5 6	Equipment and instruments ...	19 3 5		
			10 2 7	Consumable stores	72 19 0		
			18 8	Incidental expenses	2 1		
			1 8 0	Books, &c.	1 8 0		
			30 17 9	Postage, telephones and telegrams	27 13 2		
			11 8	Travelling and motor car expenses	15 9 2		
			—	Balance	35 6 7		
£402 8 2		£266 8 3	£402 8 2		£266 8 3		

Falmouth Weather Station.

£ s. d.		£ s. d.		£ s. a.		£ s. d.	
7 0 8	Expenses refunded locally ...	8 6 11	15 0 0	R. Cornwall Polytechnic Society...	15 0 0		
108 11 1	Balance	171 18 3	59 17 6	Salaries, Scheduled	102 7 6		
			—	„ Additional	—		
			—	Rent, Rates, Taxes, Repairs and Insurance	30 2 10		
			1 7 2	Equipment and instruments ...	—		
			1 0 11	Consumable stores	—		
			15 8	Incidental expenses	13 1		
			29 12 3	Postage, telephones and telegrams	31 18 9		
			7 18 3	Travelling expenses	3 0		
£115 11 9		£180 5 2	£115 11 9		£180 5 2		

Adv. Com. Atmos. Pollution.

£ s. d.		£ s. d.		£ s. d.		£ s. d.	
—	Subvention	500 0 0	—	Salaries scheduled	57 10 10		
			—	Equipment and instruments ...	10 10 9		
			—	Incidental expenses	18 0		
			—	Postage, telephones and telegrams	16 10		
			—	Balance	430 3 7		
£ —		£500 0 0	£ —		£500 0 0		

BENSON.

1916.	Receipts.	1917.	1916.	Payments	1917.
£ s. d.		£ s. d.	£ s. d.		£ s. d.
10 0 0	Expenses refunded locally ...	—	170 6 6	Salaries, Scheduled...	240 10 3
220 13 7	Balance	313 11 1	6 0	Overtime, &c.	1 13 6
			—	Cost of forms, &c.	—
			—	Rent, Rates, Taxes, Repairs and Insurance	—
			1 10 0	Fuel and Lighting	3 5 0
			28 5 1	Equipment and instruments ...	—
			11 17 6	Consumable stores	45 2 4
			2 7 0	Incidental expenses	1 5 4
			1 11 6	Books, &c.	10 6
			12 9 0	Postage, telephones and telegrams	21 4 2
			2 1 0	Travelling expenses	—
£230 13 7		£313 11 1	£230 13 7		£313 11 1

METEOROLOGICAL OFFICE, EDINBURGH.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
186 16 6	Balance	189 12 3	175 0 0	Subvention	175 0 0
			11 16 6	Travelling expenses	14 12 3
£186 16 6		£189 12 3	£186 16 6		189 12 3

MISCELLANEOUS STATIONS.

£ s. d.		£ s. d.	£ s. d.			£ s. d.
48 12 3	Cost of forms refunded	63 0 11	172 5 0	Subventions, Aberdeen, Armagh	172 5 0	
558 8 1	Balance	534 14 3	12 10 0	British Rainfall Organisation ...	12 10 0	
						184 15 0
			306 4 0	Salaries of Observers (36)		345 19 0
			53 9 6	Cost of forms, &c.		36 0 0
			4 3 6	Rent, Rates, Taxes, Repairs and Insurance		2 4 5
			—	Fuel and lighting		1 0 9
			9 7 4	Equipment and instruments ...		—
			19 6	Consumable stores		—
			21 10 2	Agents' fees, &c.		9 9 8
			2 16 6	Books, &c.		2 14 4
			23 14 10	Postage, telephones and telegrams		15 12 0
£607 0 4		£597 15 2	£607 0 4			£597 15 2

METEOROLOGICAL FIELD SERVICE.

FRANCE.

£ s. d.		£ s. d.	£ s. d.		£ s. d.	£ s. d.
—	War Office	545 18 6	15 18 8	Salaries : Major E. Gold	28 15 0	
200 7 2	Balance	332 4 4	8 10 10	Capt. A. H. R. Goldie ...	—	
			—	Lieut. E. H. Chapman ...	—	
			—	Lieut. F. Entwistle ...	—	
			20 15 8	Sergt. R. Pyser	13 14 6	
			17 2 0	Corpl. E. L. Clinch ...	16 18 0	
			28 18 10	Corpl. A. G. Goad ...	35 11 10	
			—	Corpl. C. F. J. Jestico ...	17 2 8	
			—	Corpl. R. M. Poulter ...	14 2 9	
			91 6 0		126 4 9	
			24 16 8	Cr.—Amounts refunded	2 11 0	
						123 13 9
			66 9 4			
			—	Salaries : Overtime ...	—	—
				Incidental Expenses :		
			10 17 2	Postage	12 18 5	
			—	Telegrams	—	
			—	Printed books ...	—	
			12 6	Miscellaneous... ...	7 5	
						13 5 10
			122 8 2	Instruments		741 3 3
£200 7 2		£878 2 10	£200 7 2			£878 2 10

DARDANELLES.

£ s. d.		£ s. d.	£ s. d.		£ s. d.	£ s. d.
124 5 6	Admiralty	307 15 2	—	Salaries : Capt. E. M. Wedderburn	—	
186 1 2	War Office	1,369 12 9	4 6 8	Corpl. C. V. Ockenden	12 16 0	
587 1 6	Balance	—				12 16 0
			19 10 6	Salaries : Overtime ...	—	—
				Incidental Expenses :		
			5 14 7	Postage	12 2 4	
			560 16 0	Telegrams	904 6 0	
			—	Printed books ...	—	
			1 11 8	Miscellaneous ...	—	
						916 8 4
			305 8 9	Instruments	... ...	132 5 5
			—	Balance	... ...	615 18 2
£897 8 2		£1,677 7 11	£897 8 2			£1,677 7 11

Proof Unconfirmed.

EIGHTY-FIRST MEETING.

South Kensington, S.W.7., 28th November, 1917.

PRESENT:

THE DIRECTOR, IN THE CHAIR.

THE HYDROGRAPHER.	MR. MIDDLETON.
MAJOR LYONS.	DR. SCHUSTER.

664. The MINUTES (651–663) of the last Meeting (24th October, 1917), previously circulated, were ordered for revise.

COMMITTEE.—**Royal Society Representatives.**—Reported—that *Major Lyons'* term of appointment as a member of the Committee would be completed on 26th February, 1918, but that he was eligible for re-appointment. The Director had communicated with the Treasury upon the matter.

665. CORRESPONDENCE.—**Ministry of Reconstruction.**—*Draft Memorandum of Reply* (Minute 652).—Reported—that suggestions had been received from the Hydrographer, Mr. Middleton, and Major Lyons.

It was agreed to incorporate the various amendments in the memorandum before forwarding it to the Ministry of Reconstruction.

County Fire Office.—*Insurance against Air Raids.*—Reported—that in accordance with Minute 652 the Director had addressed a letter to Mr. Barstow asking for an indication of Treasury instructions in the matter.

666. 12TH ANNUAL REPORT (Minute 653).—Submitted—Revise of the 12th Annual Report, previously circulated.

Approved and signed.

667. OFFICE STAFF.—**Forecast Division.**—*Continuous Service.*—Reported—that arrangements had been completed for the continuous attendance day and night of the Forecast Division, and that the service had been commenced on 19th November, 1917.

In order to provide for this service the following transfers had been necessary:—

H. L. B. Tarrant (temporarily), Principal Clerk, from the Central Registry, as Senior Technical Assistant.

Miss L. D. Sawyer, B.A.Lond., from the Statistical Division, with promotion to the grade of Junior Professional Assistant, at a salary of £175 per annum, inclusive of endowment assurance under Minute 517.

F. C. Warmington, Boy Clerk, from the Marine Division, as Junior Technical Assistant.

During Mr. Tarrant's absence from the Central Registry, *Miss D. G. Chambers* was to be in charge, with a temporary increase of pay of £40 per annum as "Charge Pay."

Reported further—that *A. G. W. Howard*, Senior Technical Assistant, who had recently been absent on sick leave through nervous breakdown, had been temporarily transferred to the Marine Division. Authority was required to continue the rate of pay he had received in the Forecast Division.

Reported further—that on the initiation of the new arrangement, the Superintendent of the Forecast Division had recommended that—

A. T. Bench, Staff Clerk, be promoted to the grade of Staff Assistant, and that

F. W. Beaver should receive an increase of pay of 4*s.* 6*d.* weekly, making a total of 30*s.* a week.

Approved.

Office Keepers.—*W. H. Parsons* (Minute 654).—Reported—the receipt of a letter from the London County Asylum stating that there was no prospect of Mr. Parsons being fit to resume work at the Office within the next few months.

It was agreed that after the end of the current year a pension on the usual terms should be granted to Mr. Parsons, and that the endowment assurance policy taken out for him should become the property of the Office.

New Appointments.—Reported the following Director's Orders for confirmation :—

Order 631, appointing *Mrs. E. A. Stocks* temporary assistant in the Central Registry, at a salary of £2 per week, inclusive of war bonus. The appointment dates from 12th November, 1917.

Orders 630 and 641, appointing *W. E. King* (discharged from the Army as being under age) as temporary draughtsman in the Marine Division, at a commencing salary of 25*s.* a week, inclusive of war bonus. To date from 25th October, 1917.

Order 632, appointing *Miss D. R. M. Figgins* temporary assistant in the Statistical Division at a salary of 31*s.* per week, inclusive of war bonus. To date from 19th November, 1917.

Order 647, appointing *Miss H. D. Newsholme* temporary clerk in the Central Registry, at a salary of £2 per week, inclusive of war bonus. To date from 3rd December, 1917.

Order 635, appointing *G. F. Bassett* assistant packer in the Instruments Division in accordance with the provisions of Minute 654, at a salary of 29*s.* 6*d.* per week, with a war bonus of 9*s.* per week. To date from 19th November, 1917.

Order 636, appointing *John B. Morley* (born 8th February, 1901) Boy Clerk at Valencia Observatory on the terms of Circular 002, with a war bonus of 4*s.* per week. To date from 19th November, 1917.

Order 642, appointing *G. Woodham Smith*, discharged from the Army as unfit, temporary assistant in the Inquiries Section, at a salary of £2 per week. To date from 26th November, 1917.

Approved.

Reported further—that the War Office had consented to lend the services of *W. F. Stacey*, *F.R.G.S.*, *F.R.Met.Soc.*, 2nd Lieutenant K.O.R. Lancaster Regiment, during his period of light duty after convalescence, and that he would be attached to the Forecast Division.

South Farnborough.—*Miss Brierley.*—Reported—that Miss Brierley, clerk at the Branch Meteorological Office, South Farnborough, had applied for a war bonus and that it had been ascertained that a bonus of 5*s.* a week would make up her rate of pay to that allowed for women of the same qualifications in the R.A.F.

It was agreed to allow a bonus of 5*s.* a week and to reclaim the amount from the War Office.

Exemptions.—Reported—the further extensions of the exemptions of :—

E. P. Pearce, Storekeeper in the Instruments Division, till 1st March, 1918 ;

A. J. Tabor, Clerk Computer in the Marine Division, till 26th January, 1918.

Enlistment.—Reported further—that *W. R. Penfold*, Boy Clerk in the Statistical Division, had been called up for military service on 26th December, 1917.

It was agreed to appoint a temporary assistant to take his place during absence.

668. Publications.—**Computer's Handbook.**—Copies of a *diagram of pressure, temperature and density* at various levels, for insertion in Section II of the Computer's Handbook, were laid on the table.

Reported further—that *Section III, Subsection I* had been prepared and was ready for printing.

Special Weather Report B.—Reported—that in consequence of the large numbers of the Report which were now necessary for supply to the Admiralty, War Office and other official addresses, the present method of duplication of Report B, issued at 11.30 a.m.,

was unsatisfactory ; and authority was required for an application to the Stationery Office for reproduction of this Report by lithography.

Approved.

669. ESTIMATES FOR 1918–19.—A summary of materials for Estimates for the year 1918–19, showing that the proposed expenditure would exceed the Grant-in-Aid by £6,794, was submitted. It was not proposed to recover from the Admiralty and War Office the cost of Mediterranean weather telegrams sent by instruction of those departments, but to ask the permission of the Treasury to charge the amounts directly to the Vote of Credit. It was also thought undesirable to claim the grant of £250 from the Advisory Committee for Aeronautics, as the further investigation of the travel of thunderstorms, for which the grant had hitherto been made, required the co-operation of the observatories at Eskdalemuir and Cahirciveen with the Branch Office at South Farnborough and had become a general meteorological inquiry. These two deductions, together with the increased costs of salaries and telegrams, would necessitate an application to the Treasury for the sum of £7,000 for 1918–19 from the Vote of Credit, leaving the Grant-in-Aid at its present figure.

It was agreed to make such application to the Treasury, and the Estimates for the year 1918–19 were approved as follows. The covering letter to the Treasury (submitted by post for the approval of the Committee) is appended.

SIR, 22nd Decembr, 1917.

IN reply to Treasury letter No. 33559/17 of 25th October, 1917, I am instructed by the Meteorological Committee to forward the enclosed statement of the expenditure estimated to be necessary to maintain the Meteorological Service as at present arranged during the ensuing financial year 1918–19.

2. The work has been undergoing some important developments during the current year and the figures show that if it be continued on the present basis the grant-in-aid fixed in 1915 at £22,500 will not be sufficient to meet the expenses. The deficiency would arise principally on account of two items, namely, salaries £3,411 and telegrams £1,445, augmented to £2,455 by the consideration set out below.

On behalf of the Committee I am to request you to submit for Their Lordships' consideration the suggestion that authority should be given to relieve the grant-in-aid by charging a total sum of £7,000 on account of these items against the Vote of Credit, since the expansion of both is directly due to the war, though in somewhat different ways, and both are liable to be further increased in order to meet the requirements of the naval, military and air services.

3. First as to salaries : the conditions are as follows :—

(1) There is a direct increase at present amounting to £1,173 on account of the war-bonus for employees of the Office as sanctioned by the Committee on terms laid down by Their Lordships for the Civil Service, and £1,250 is allowed in the estimated expenditure of the coming year under that head. (2) In accordance with the Civil Service rule also, a sum of £690 a year is paid to make up Navy and Army pay to the civil pay of members of the Office staff serving with the colours. (3) Every department of the work of the Office is from time to time laid under contribution to supply from its records and other facilities information called for by the various departments of Government—Naval, Military or Civil—so that all the work has to be kept going, and in the forecast division the demands of the Naval, Military and Air Services have called for a large increase in the work, eventuating in continuous attendance day and night of a forecaster with technical assistance for the preparation and issue of reports in a variety of forms four times in every 24 hours. For this purpose the professional and technical staffs of other divisions have been drawn upon and depleted below the working limit.

In considering the proper national provision for the supply of forecasts and other information for the public services the Committee have taken up the position that it is better to have one central institution for the preparation of forecasts by a specially skilled staff than for the several services to have their own forecast staff and to issue independent reports. This action implies the guarantee that this part of the work of the central institution shall not fail for want of staff or material. Provision has been made to meet the increased demands, and the estimated cost of salaries in the Forecast Division has risen to £4,120 as compared with £2,413 allowed for that item in the estimates of 1915–16, an increase of £1,707, in spite of the fact that the division has been relieved as far as possible, of extraneous duties. This includes provision for two senior members who have reached the age of superannuation and who cannot undertake the full turn of duty of a forecaster-in-charge. Moreover, the division has temporarily the assistance of a lieutenant and three non-commissioned officers with the requisite scientific training, whose services are lent by the War Office for duty at the Office, and two pioneers of the Meteorological Section, R.E., in training for duty abroad. If these gentlemen have to be replaced by duly qualified persons directly employed and paid by the Office the sum of £850 will be necessary.

Adding these items £1,250, £1,707, £690, £850 (£3), it appears that an increased charge of £4,500 in respect of salaries is directly due to the emergency of the war and may properly be regarded as a charge upon the vote of credit instead of the normal grant-in-aid for the Office.

4. In respect of telegrams. The situation is somewhat similar. The cost of telegrams in the coming year is set down as £4,110, an increase of £1,445 on that estimated last year. The increase of expenditure has now more than overtaken the economics resulting from the suspension of reports by radio-telegraphy from ships and the exclusion of telegrams from enemy countries.

In order to obtain the best available information for the Air Services and Home Defence, telegrams are received daily reporting observations of currents in the upper air made with pilot-balloons at Naval Air Stations, and other special telegrams are received, so ne of which are charged against the sending departments. The cost of messages for the Meteorological Services is legitimately charged against the Meteorological-Office-Account with the Post Office. But there is no item *per contra* of receipt wherewith to meet the increased expenditure because no charge is made for information sent out by the Office to Government departments.

It is difficult to make an estimate of the cost of telegrams beforehand because the facilities for obtaining information are constantly altering and the Office cannot miss any occasion for improving its service. The estimated sum required this year is £4,110. The Committee again suggest that of this item of expenditure £2,500 should be met by drawing upon the Vote of Credit, and in this sum they include £1,150 entered in the estimates of last year as an appropriation-in-aid because it was recoverable from the Admiralty or War Office as chargeable on Navy or Army Votes.

The telegrams represented by this sum furnish the basis of technical material for the Meteorological Section, R E., at Salonika, which was initiated in 1915 at the request of the Admiralty. And hitherto the payments (consisting almost entirely of charges by the Eastern Telegraph Company) have been recovered from the Admiralty or War Office. This is no longer a convenient mode of procedure because these departments are not interested in the details of the accounts and the irregularity with which, unavoidably, the accounts are rendered makes bookkeeping and estimating correspondingly awkward. The Committee submit that no advantage now accrues by the recovery of the charges and they suggest that they have authority to charge them to the Vote of Credit directly and accept the responsibility for the expenditure.

Accordingly in respect of telegrams I am to suggest that the Committee be authorised to draw upon the Vote of Credit to the extent of £2,500.

5. These two sums, amounting to £7,000, are sufficient to cover the difference between the estimated expenditure at current rates and the grant-in-aid. The other items of increase are small and are accounted for on the one hand by the increased cost of materials and on the other by the restriction of the services to the public by which the Office used to earn a certain amount of revenue.

If these authorities be allowed, the grant-in-aid according to the estimate will cover the rest of the expenditure, and the Committee would take the opportunity of surrendering the special subvention of £250 a year received by the Advisory Committee for Aeronautics for special experimental researches in meteorology undertaken by the Director for the Advisory Committee. The particular investigation for which this grant has been received is an inquiry into the means of locating thunderstorms and predicting their approach by radio-telegraphy. The initial experiments were made at the Experimental Station of the Branch Office at South Farnborough, and now that all the services practically make similar demands upon meteorology the further progress of the investigation may fairly be regarded as a meteorological problem and the charges borne upon the Office vote.

The authorities asked for as charges upon the Vote of Credit are :

War bonus ... ... For increases of salary and special staff for war service	£4,500
For inland telegrams, telegrams from abroad and telegrams sent abroad on war service.	£2,500

Of the total sum £1,400 is at present recoverable either from the Admiralty, War Office or the Air Board, so that the new charges are £5,600. The Committee consider that it is better to meet the exceptional expenditure on account of the war as a charge upon the vote of credit than to endeavour to adjust the grant-in-aid in present circumstances.

If you will be good enough to take Their Lordships' pleasure upon these proposals, I will make the necessary adjustments in the estimates to show the proposed expenditure of the grant-in-aid.

I am, &c.,

NAPIER SHAW.

The Secretary,
H.M. Treasury,
Whitehall, S.W.1.

METEOROLOGICAL OFFICE. ESTIMATES for the Year 1918–19.

—	Proposed, 1918–19.	Voted, 1917–18.	Increase.	Decrease.
	£	£	£	£
Director	1,000	1,000	—	—
Salaries :				
Office	14,284	12,648	1,636	—
Observatories	4,627	4,079	548	—
War bonus	1,250	—	1,250	—
Meteorological Field Service	1,647	1,670	—	23
Expenses of Office :				
Rent, heating, and lighting	700	700	—	—
Furniture and equipment	100	100	—	—
Library	50	50	—	—
Insurances and repairs	120	120	—	—
Incidental expenses and consumable stores	200	250	—	50
Post Office charges :				
Postage	800	750	50	—
Telephones	120	100	20	—
Telegrams	4,110	2,665	1,445	—
Stationery Office (S.O.P.)	120	120	—	50
Travelling expenses	150	200	—	—
Superannuation allowances :				
Annuities	562	562	—	—
Pensions not chargeable on Fund	25	25	—	—
„ chargeable on Fund	276	276	—	—
Contribution to Fund	1,000	474	326	—
Cost of instruments	10,000	8,300	1,700	—
Expenses of M.O. Observatories :				
Subventions	30	30	—	—
Rent, rates, taxes, repairs, and insurances	192	192	—	—
Fuel and lighting	263	243	20	—
Equipment and instruments	464	450	14	—
Cost of forms	125	125	—	—
Consumable stores	148	113	35	—
Books, &c.	60	55	5	—
Incidental expenses	91	68	23	—
Postage, telegrams, and telephones	280	270	10	—
Travelling and motor car expenses	127	117	10	—
Reserve Fund	—	—	—	—
Expenses to auxiliary observatories, &c.:				
Subventions (2)	345	345	—	—
Telegraphic, anemographic, and W.W.R. stations	770	770	—	—
Incidental expenses of stations and ships, &c.	265	280	—	15
Atmospheric Pollution	500	—	500	—
British Rainfall Organization	55	55	—	—
Edinburgh Office	380	375	5	—
Lectures and experiments :				
Schuster Readership	—	—	—	—
[Unassigned	206]	—	206	—
	45,442	37,577	8,003	138
APPROPRIATIONS-IN-AID.				
Subventions for observatories :				
Advisory Committee for Aeronautics	—	250	—	250
Atmospheric Pollution	500	—	500	—
Royal Society	1,500	1,400	100	—
War Office	100	65	35	—
Antarctic Fund	—	164	—	164
Expenses refunded :				
M.O. observatories	120	206	—	86
Auxiliary observatories and stations	130	100	30	—
M.O. departmental	420	215	205	—
M.O. incidental	150	170	—	20
Stationery Office account	120	120	—	—
M.O. telegraphic expenses	—	1,150	—	1,150
M.O. telephone charges	2	2	—	—
Inspections	100	100	—	—
Instruments (Royal Navy)	9,700	4,000	1,700	—
„ (other sources)		4,000		
Superannuation, annuities and interest	604	592	12	—
Lectures and experiments	—	—	—	—
Total Appropriations-in-Aid	13,446	12,534	2,582	1,670
Army pay and deductions on account of members of the staff on War Service	2,496	2,543	—	—
Net totals	15,942	15,077	—	—
[Vote of credit, Salaries	4,500]	—	—	—
[„ „ „ Telegrams	2,500]	—	—	—
Parliamentary Grant-in-Aid	22,500	22,500	—	—

670. OBSERVATORIES.—**Gassiot Committee.** — Reported — that a Meeting of the Gassiot Committee had been held on 7th November, 1917, when a programme of work and estimates for 1918 for the observatories had been submitted and approved.

It had been resolved to recommend to the Royal Society that the magnetographs at Falmouth Observatory should be lent to the Meteorological Office by the Royal Society, and transferred for one year to the observatory at Eskdalemuir.

Reported further—that on 18th November, Dr. A. C. Mitchell, who was in London on business, had been authorised to proceed to Falmouth to inspect and dismount the apparatus, in order personally to convey the most delicate parts to Eskdalemuir. The heavier parts were to be packed and follow by rail.

Valencia.—*Tenancy of grazing land.*—Reported—that the present tenant of the grazing land had given notice of his intention to resign his holding. The Superintendent of the observatory had been able to procure another tenant for the land at a rental of 38*s.* per acre per half-year, but had not entered in a formal agreement with him pending information as to the site of the thunderstorm-detection apparatus.

The Superintendent also reported that the ground of the observatory under cultivation next year would amount to $3\frac{1}{4}$ acres, thus more than covering the legal requirements as to cultivation. (Minute 621.)

Eskdalemuir.—*Resignation of Handyman.*—Reported—that *J. Stoddart*, handyman, had resigned his position at Eskdale Observatory, as from November 20th. Arrangements had been made to provide for his work, pending a new appointment.

Approved.

671. INSTRUMENTS.—**Proposed arrangement for dealing with supplies to the Admiralty.**—Reported—that in accordance with Minute 661 a letter had been sent to Mr. Barstow on 6th November, 1917, asking that the view of the Treasury might be ascertained.

672. DIRECTOR'S REPORT AND ACCOUNTS.—Reported—that in consequence of the increased number of telephone reports over trunk lines required by the various Government Departments, the two exchange lines were simultaneously occupied for considerable periods several times each day, during which the lines were not available for calls, however urgent, either to or from the Office. Authority was required for an **additional telephone-exchange-line** which should be kept free for communication while the other two lines were occupied by regular daily trunk-calls.

Approved.

Reported—the completion of a paper on the "**Further Investigation of the minor fluctuations of Atmospheric Pressure**" which had been prepared by Mr. Corless some years ago with a series of maps illustrating by means of isobars the minor details of the variations of barometric pressure shown on the barograms of stations in the British Isles. The subject has now acquired additional importance in connexion with the relation of the observations of wind velocity made with pilot balloons to the distribution of pressure at the surface. The paper had not been put forward for publication because its most important feature consisted in the sequence of hourly maps, which numbered 25, with three maps in addition showing rainfall and the progress of two line-squalls, which could not be reduced in size or summarised effectively, and were too voluminous for reproduction in full.

Conference on Weather Reports.—Reported—that a series of monthly "Forecasters' Meetings" had been initiated, by invitation of the Director, to discuss the questions arising out of the various reports issued by the Office. Captain H. P. Douglas, R.N., Director of the Naval Meteorological Service, represented the Admiralty; Major Lyons the War Office. The Superintendent of the Forecast Divison was invited to attend with any forecasters available at the Office. The first Meeting had taken place on 12th November, 1917, when various questions raised by Captain Douglas were considered, including the substitution of wind velocities for the Beaufort numbers, azimuth from true North for wind direction in points, the phraseology of the text and the mode of reproduction of the reports A, B, C, and D, and the arrangement of the four editions of the E Reports.

Accounts.—Submitted—The following statement of the Bank Account in the Cash Book :—

	£	s.	d.
Balance on 23rd October, 1917	6,664	11	2
Receipts from 24th October to 27th November, 1917	376	0	0
	7,040	11	2
Cheques drawn from 24th October to 27th November, 1917	3,190	9	7
Balance on 27th November, 1917	£3,850	1	7

EIGHTY-SECOND MEETING.

South Kensington, S.W. 7, 23rd January, 1918.

PRESENT :

THE DIRECTOR, IN THE CHAIR.

MR. BARSTOW. | THE HYDROGRAPHER.
CAPTAIN HARVEY. | MAJOR LYONS.

MR. MIDDLETON.

673. The Minutes (664–672) of the last meeting (28th November, 1917), previously circulated, were taken as read and ordered for revise.

The Minutes (651–663) of the meeting of 24th October, 1917, previously circulated in revise, were taken as read and confirmed.

COMMITTEE.—**Royal Society Representatives.** — Reported—the receipt of letter (M.O. 6272/1917) from the Treasury as follows :—

42212/17

Treasury Chambers,
26th December, 1917.

SIR,

IN reply to your letter of the 21st ultimo (4943), I am directed by the Lords Commissioners of His Majesty's Treasury to inform you that They have been pleased to reappoint *Major H. G. Lyons, D.Sc., F.R.S.*, as the representative of the Royal Society on the Meteorological Committee for a further term of five years from the 26th February next.

I am, &c.,
JOHN BRADBURY.

The Director of the Meteorological Office,
South Kensington, S.W.

674. CORRESPONDENCE.—**Treasury Solicitor.**—*Attendance in Court.*—Reported—that following the attendance in Court, on subpœna by the Treasury Solicitor, of a member of the Office staff for the purpose of proving meteorological evidence, the Treasury Solicitor had raised the question whether payment was due to the Meteorological Office from another Government department for such attendance. The question had been referred to Mr. Barstow, who had said that as the Office was supported by a Grant-in-Aid he considered that it was entitled to charge such fees ; and upon this decision being reported to the Treasury Solicitor the account had been passed for payment.

Australasian Antarctic Expedition.—Reported—the receipt of letter (M.O. 4096/1917) from Captain Sir Douglas Mawson, asking that Dr. Chree, Superintendent of Kew Observatory, might be permitted to devote part of his time to the analysis and discussion of the magnetic results of the Australasian Antarctic Expedition, 1911–14, and suggesting that 1/8th part of Dr. Chree's time be so employed.

It was agreed to give permission for Dr. Chree to devote one day a week to work on the data of the Australasian Antarctic Expedition.

Admiralty.—*Time zones at sea.*—Reported—the following correspondence with the Secretary of the Admiralty :—

M. 72203.

Admiralty,
15th December, 1917.

SIR,

WITH reference to Admiralty Letter M. 72203 of 9th October, I am commanded by My Lords Commissioners of the Admiralty to state that they would be glad to be informed of your views on the proposal which was made by the Conference on time zones, on which you recently served, that Greenwich time should be used for all regular Meteorological observations on ships.

A copy of the report of the Conference is enclosed.

I am, &c.,
O. MURRAY.

The Director of Meteorological Office.

M.O. 6285/1917.

29th December, 1917.

SIR,

IN reply to Admiralty Letter M. 72203 of 15th December, 1917, forwarding a copy of the report of the Conference on Time-keeping at Sea and desiring my views on the proposal that Greenwich Time should be used for all regular meteorological observations on ships, I may be permitted first to note that the wording of the proposal indicates that Greenwich time should be used *as a rule* for all self-recording instruments (such as barographs), and that *the ship's clock time* should be used for the regular meteorological observations. Ship's clock time, according to the recommendations of the Conference, would presumably be zone-time, not Greenwich time.

The question is a very technical one, and so far as this office is concerned, the decision should be guided by the use which is to be made of the records and observations when they are collated on shore. Their immediate use at sea is, of course, not affected by the system of time-keeping employed.

The recording instruments run for a week, and the trace is made on a sheet ruled for upwards of 84 time-spaces of two mean solar hours each. Accurate timing is essential to the proper use of the records, and it would scarcely be possible to make any use at home of a series of consecutive records if the pen were set to a new time-standard day by day or even week by week. Consequently an invariable standard of time for the whole set of records of a voyage seems imperative, and for general purposes the Greenwich standard which is kept by the ship's chronometers is obviously the best. But for a ship stationed, for example, in Australian waters and making voyages only in those waters, it is probable that the use of the Greenwich standard for the barograph, while a local standard was used for everything else on board ship, would be thought to give unnecessary trouble to the men in charge who are concerned with the immediate use of the information, and it is thought that in such circumstances the trouble of collating the time of any event recorded by the instrument with that shown on other records from the same or different localities had better devolve upon the central offices that have ultimately to use them.

The regular or eye-observations made daily by the officers of the ship are on a somewhat different footing. According to the *Instructions for keeping a Meteorological log* they are to be made six times a day, at 4 a.m., 8 a.m., noon, 4 p.m., 8 p.m., midnight, *ship's* time. The Admiralty instructions prescribe the same hours for the meteorological observations to be entered in the logs of H.M. ships and vessels, and as both sources are drawn upon by this Office for the compilation of data for meterological charts, it is important that the accord should be maintained. It also agrees with international practice.

We collect also from liners schedules of observations at 8 a.m. and 8 p.m. ship's time. But for our arrangement about the transmission of reports from H.M. ships and vessels and liners by wireless, specific observations at fixed hours of Greenwich time are used. The United States Weather Bureau (or Signal Service) collects observations at *Greenwich noon* from all ships touching American ports and willing to contribute. So ship's time is the practice, but Greenwich time was already, to some extent, in use before the war.

The practice of using ship's time is connected partly with the convenience of routine of working the ship, and partly with a general meteorological practice of using *local time* for observations intended to be used for the study of climate. In this country we use Greenwich time for the operations of all our observatories and many of our stations ; but local time is prescribed by international regulations, and is regularly employed, for example, in Austria and Russia ; because the diurnal variations of the elements are thereby automatically referred to the position of the sun which controls them. The United States and Canada use 75th meridian time for the official stations because they require them for telegraphic purposes and the climatological data have to be interpreted accordingly.

The procedure with regard to the observations when they are collected here is to transfer them to monthly data books with one page for every degree-square ; they are sometimes aggregated for 2-degree squares or 5-degree squares or even 10-degree squares. From the data thus collected we may aim at obtaining :

(1) mean monthly values of the meteorological elements, combining all the observations in the month irrespective of the day or hour at which they were made ;

(2) the diurnal variation of the elements in the several localities in the several months by sorting the observations into hours ;

(3) the tracing of the details of any important meteorological event, such as a notable cyclonic depression.

Hitherto attention has been almost exclusively directed to (1) for which, of course, the time-standard selected is of no importance. For (2) we have only dealt with diurnal variations in the nine

ten-degree squares in the equatorial Atlantic between Africa and South America; but certainly the study of the diurnal variation of pressure, wind, temperature, fog, cloud and rain is called for in the practical interest of seamen as well as that of science, and should be regarded in dealing with the time-standard to be adopted for meteorological observations. For (3) we occasionally make extracts from the logs for the purpose of legal inquiries or for the study of atmospheric phenomena.

There is little doubt that for statistical purposes and for charts the data are most easily worked when the observations are according to local time. They can be grouped for larger areas without errors interfering. Short of correct local time it may be fairly urged that Greenwich time is the next best and as, with the high speed of modern ships, local time cannot be strictly kept for the observations, we are prepared to regard Universal Greenwich Time as best because it enables us to make sure of exact timing for all the observations, and we then have to rely upon our skill in grouping to extract the necessary results.

The use of zone-time is a compromise. It will, to a certain extent, affect our computations, and there will nearly always be an element of uncertainty as to the exact local time of any event, which would be avoided by using Greenwich time for all observations. This is a matter of importance for us because with exact timing we can contemplate an extended use of observations at sea for the construction of synchronous charts and the tracing of the details of meteorological phenomena over large areas of which wireless telegraphy enlarges the possibility to unlimited extent.

If we suppose, as it is fair to do, that in future the commander of a fleet at sea will collect observations by wireless and chart them for his information, it is practically essential that they should be synchronous and the practice of using fixed Greenwich hours would become necessary.

We are, therefore, on the whole decidedly in favour of Greenwich Time for the regular meteorological observations at sea, and I am the more willing to express that opinion now because the Superintendent of the Marine Division, himself a retired Captain of the Mercantile Marine, informs me that according to his view Universal Greenwich Time should be regarded as more convenient for the ordinary routine of the ships than the zone time. That is, however, not the opinion of the French Navy, nor was it the opinion of the Conference after considering the question. They distinctly say that it is not at present practicable, which means, for example, that Atlantic liners would sooner alter the clocks than alter the dinner hour. Our own experience in Summer Time of an alteration of the clock being the easiest means of adjusting routine to requirements is perhaps convincing on that point. I do not think it would be wise to press for Universal Greenwich Time for meteorological observations at sea while zone-time is being used for all the routine operations of the ship. It would mean that the duty of observing would wander from one watch to another and would clash in turn with all other duties and perhaps meal-times or recreations, so that the risk of failure of regularity of the observations would be considerable.

Looking, however, upon zone-time as a step towards Universal Greenwich Time for all operations on sea and land, I am in favour of accepting it for meteorological observations at sea as, in all the circumstances, most likely to give the most satisfactory results, though I still regard Universal Greenwich Time as the ideal for modern times. I am encouraged to take that view because it was suggested to me some time ago by a professor of meteorology in a prominent University of the United States.

I am, &c.,
NAPIER SHAW.

The Secretary,
Admiralty,
Whitehall, S.W. 1.

Admiralty.—*Time Keeping in Switzerland.*—Reported—the receipt from the Hydrographer of an extract from an American Report stating that the Swiss Associations for Geology, Meteorology, and Astronomy had petitioned the Federal Council to adopt the 24-hour clock as the official method of reckoning time; and that the authorities of the Swiss Railways, Post Office, Telegraphs and Customs departments had also expressed themselves to be in favour of the change.

Ministry of Reconstruction.—*Memorandum on Reconstruction of the Meteorological Services after the war* (Minute 665).—Reported—that in accordance with Minute 665 the following memorandum had been sent to the Minister of Reconstruction :—

RECONSTRUCTION : MEMORANDUM ON THE METEOROLOGICAL SERVICES.

I. *The universal importance of organised knowledge of weather.*

The experience of the war has given additional emphasis to facts which were already well known to those who had given attention to the matter, and which form the ultimate justification of a public meteorological service, namely :—

(1) That the weather is an important consideration in every species of human affairs and the use of knowledge of the weather is by no means confined to successful anticipation of the weather of the near future. Very many of the affairs of life, public and private, can be usefully guided by organised knowledge of past weather experienced and recorded in different parts of the country or of the world. Leaving out of account gunnery or other details of naval and military operations in regard to which there have been many notable references in the history of the war, points have arisen in respect of *administration* as to questions of food supply, water supply, roads, public health and conditions of working in factories, &c., in respect of *navigation and transport by sea and land*, and more recently of aerial transport, of *agriculture and commerce* as to the climatic conditions of various countries, their variation with season and from year to year, of *engineering* as to the ordinary conditions of working of engines at all levels of the atmosphere in many parts of the world;

(2) that the knowledge of the weather actually in progress as embodied in reports collected from a wide area by telegraph from a number of organised stations and distributed with equal rapidity is so great an advantage for many purposes of administration as to be regarded as indispensable ;

(3) that information founded upon both these aspects of the meteorological service in combination forms the only scientific basis for forecasts of coming weather as developed at present, and for the improvement of the forecasts by progressive study on scientific lines.

II. *The meteorological service as a public service acting in co-operation with other countries.*

The very wide extent, both in space and time, of the sources of meteorological information and the necessity for organisation and control in co-operation with the corresponding organisations of other countries make the collection of material for the study of weather pre-eminently the subject of a public service as distinguished from a private organisation or a collection of private organisations. In all civilised countries there is a government meteorological institute which acts in co-operation with the corresponding institutes of other countries. The mode of co-operation has been organised by a series of international assemblies commencing in 1854 and continued until 1913. A meteorological institute as a government institution differs from the ordinary departments of government in being intended for initiation and not for the control of the spontaneous initiative of others.

III. *The basis of the meteorological services.*

In all countries except the United Kingdom and Germany the meteorological organisation has been built up on the requirements of agriculture and public welfare in respect mainly of rainfall. In the United Kingdom the Government meteorological establishment has been based upon the requirements of shipping, for which a separate meteorological department was established in 1854 by the Board of Trade. That has been gradually modified and extended to form the present organisation. In Germany each state has its own meteorological establishment to deal with rainfall and other climatic elements, while a separate Imperial organisation in connexion with the Navy is constituted the central meteorological establishment for shipping, and is also the chief centre of the service of forecasts and gale-warnings for which, in recent years, a number of local centres have been set up in the various states to deal with local interests in the anticipation of weather.

IV. *The British Meteorological Services.*

The Government provision for meteorology in the United Kingdom now includes all branches of the subject but, for a reason which will be set out below, no attempt has been made hitherto to deal in detail with the facts about rainfall and water-supply. The peculiarity in this respect is explained by the history of the Meteorological Office and other meteorological institutions in this country. The Meteorological Office began in 1854 as a department of the Board of Trade exclusively for the purpose of collecting information about the meteorology of the sea, and in 1860, also in the interest of shipping, it took up the work of collecting daily reports by telegraph and commenced the work of forecasting. To that in 1867 was added the duty of studying the scientific aspects of forecasting with the aid of the records obtained at a number of observatories established for the purpose. The revised establishment was placed outside the Civil Service in control of a committee appointed by the Royal Society with a "grant-in-aid." The "terms of reference" of the Committee were still very much restricted, and in the meantime three other organisations arose on a voluntary basis for other sections of the work of a complete establishment ; the first for the collection of rainfall-data begun by Mr. G. J. Symons, an assistant in the Office, has become the British Rainfall Organization ; the other two, for the collection of climatic data of all kinds from voluntary observers have been originated by the Royal Meteorological Society and the Scottish Meteorological Society respectively. The latter has been recognised and subsidised through the Registrar-General for Scotland as an official centre for information on the climatology of Scotland. There are also a number of local associations of voluntary observers for the compilation of data for rainfall and other climatic data.

There were thus four independent meteorological authorities, the Committee of the Royal Society, in charge of the Meteorological Office, for the meteorology of the sea, forecasts, gale-warnings and the study necessary for their improvement ; the British Rainfall Organization in charge of the body of rainfall statistics, a private adventure ; and the two Meteorological Societies which dealt with climatology. At the same time the head of the Meteorological Office was the official representative of the country at the various international meetings and for the discharge of international obligations, the office became the responsible authority and obtained from the Societies the necessary data to supplement what the Office itself possessed.

All four bodies have, therefore, between them, discharged to the best of their ability the duties which in the United States, India, Canada and Australia are a recognised charge upon the Central Meteorological Institute. Of the four, the Office has been financed by Government by a grant-in-aid for the maintenance of its staff and establishment of observatories and stations, and for the international requirements ; the British Rainfall Organization, as a scientific enterprise, has received subscriptions from some among its large body of several thousand contributing observers, but has mainly depended on the intrinsic value of the collected data in all questions of water-supply ; the Societies have depended upon the subscriptions of their members with the voluntary contribution of observations supplemented by the small sums paid by the Office in consideration of the supply of information for official publication on an international basis.

By its personal association with international meteorological work, which has always been interpreted by the periodical assemblies to include climatology, atmospheric electricity and terrestrial magnetism as well as the exchange of telegraphic reports for the daily weather services, the Office has gradually accepted the responsibility for those sections, though until 1910 it had no specific facilities for the discharge of the responsibility. In 1910 it acquired administrative control of observatories

which were intended for the special study of the physics of the air or the earth; and, as the outcome of negotiations with the Societies, it has also recently taken over responsibility for the general climatological work of the home countries. It has also, in an informal manner, acted in an advisory capacity to the Colonial Office for the meteorology of those Colonies and Protectorates which have no definite meteorological organisation of their own, and has been in regular correspondence with the meteorological authorities of the Dominions and India.

From 1877 to 1905 the operations of the Office were directed by a council of six members, of whom the Hydrographer was *ex officio* one. The others were distinguished men of science appointed by the Royal Society. The Hydrographer was mainly responsible for directing the work on the meteorology of the sea, which was in charge of a Marine Superintendent. The direction of the rest of the work, which by the terms of reference was chiefly concerned with the daily weather service and the general meteorological problem of the sequence of weather, was conducted by the Council with a secretary who was in charge of the Office. The Council had authority to initiate separate special investigations by scientific men appointed for the occasion. The official contribution to climatology was practically confined to the publication of data in weekly and monthly, quarterly and annual reports. Since 1905, the Office has been in charge of a director with an Advisory Committee appointed by the Treasury, which includes two representatives of the Royal Society, the Hydrographer, and a representative of the Board of Trade, the Board of Agriculture and the Treasury, respectively. Its operations are not now restricted by any specific terms of reference.

The Meteorology of the Sea has always been interpreted to include the equipment of stations on remote islands and also assistance of various kinds for the meteorological work of exploring expeditions, but there has been no definite provision for the organisation of the meteorological work in those parts of the Empire for the development of which proper meteorological data are essential and which require assistance from this country in the establishment, supervision and control of the work in a methodical manner.

Looked at from a general point of view, the whole scheme of meteorological operations has been mainly upon a voluntary basis. The Office maintains about 30 stations for the daily weather service, including eight fully-equipped observatories, and it has access to the official observations entered in the logs of H.M. ships, and also to the records of the weather stations, now numbering 20, of the Naval Meteorological Service. All the rest of the original data are obtained on a voluntary basis.

For marine meteorology, before the war, it supplied instruments for voluntary observations to the officers of some 150 merchant ships, whose services were obtained largely by the personal influence of the Marine Superintendent; for the climatology of the British Isles observations were collected from about 500 stations, some for rainfall only, others for temperature and sunshine. Many of these are maintained by municipal authorities or local organisations, others by landowners or amateur meteorologists. Meanwhile for the indispensable information about rainfall, the country relies upon the some 6,000 observers who contribute their observations to British Rainfall Organization and are also rated as voluntary, though many of the observations are contributed by water companies or municipal authorities, and all official observations are contributed by the Office.

V. *The voluntary system.*

The system of voluntary observations of rainfall or other elements of weather originated in the first instance and is still maintained on the principle that such observations form a contribution to meteorological science. The appeal was originally addressed to persons who were willing to associate themselves with the progress of science, and to make the necessary sacrifice of time and money for that cause. It was claimed that those who enrolled themselves voluntarily among the votaries of science produced more trustworthy observations than could be obtained from compliance with official regulations and they were thus obtained with the minimum of cost. The claim has been well justified by the excellence of the results obtained by the Office and by British Rainfall, the Societies and other voluntary organisations. A voluntary organisation is very effective in those cases in which the observers can be directly associated with the scientific success of the enterprise, but as the work develops and the individuality of the observers becomes merged in the co-ordination of results, the appeal becomes less imperative, and after the first outlines of the results of voluntary co-operation have become settled it is apparent that the real efficiency of further progress is dependent upon a more organised distribution of stations than the appeal on scientific grounds can secure.

In the infancy of an investigation which is by its nature co-operative, all trustworthy observations are fairly regarded as a personal contribution to science, but in the later stages, after 50 years of voluntary effort, when all sense of novelty has disappeared, the sense of public duty should be brought in aid of the original enthusiasm. In order to solve the problems which now require solution, the old stations or effective substitutes must be continued, while new stations must be added and new grounds for continued action must be sought.

Since the voluntary system has been successful in the home country, it has been the practice to depend upon it also for new countries and to make the work of keeping a record of weather a voluntary addition to the ordinary work of the medical officer or some other official, but when there is no personal association, the system is neither efficient from the scientific point of view nor sufficient for administrative purposes.

VI. *The maintenance of a library by exchange of publications.*

One of the most important functions of a central meteorological office is the formation of a library of meteorological information for all parts of the world in order that it may be available for any purpose when required. This is mainly obtained by the exchange of official publications for the corresponding publications of all other countries. The collection of data so formed, with the manuscript records of its own stations, forms an enormous body of material to which constant reference is made if the organisation and arrangement are carefully maintained.

VII. *The additional requirements disclosed by the experience of the war.*

At the outbreak of war the Meteorological Office was possessed of very complete meteorological data, but no special arrangements had been made to anticipate the requirements of the naval and military forces. Special compilations of data had therefore to be improvised when the demands of the Navy and the Army were made known. In Germany some of the compilations which we have found necessary had already formed the subjects of University exercises. It is a matter of great regret that in this country there is practically no academic provision for the teaching of meteorology, and the study of weather is not an avenue to a degree at any university of the British Empire.

When war broke out many compilations of data for the services were made at the Office, and two establishments for the collation of data were set up by the Admiralty in charge of amateur meteorologists.

For the requirements of the Air Services we were better prepared, as provision had been made for the study of the upper air, partly as a special subject of scientific inquiry and partly as the special work of a branch office at South Farnborough, which was established at the request of the War Office when the Royal Flying Corps was organised.

But the requirements of the Navy, the Army, and the Air Services during the war have gone beyond what the Office was able to supply from its own establishments. For the Naval Air Service special provision had been made by the Admiralty when the Royal Flying Corps was organised, which has since been modified and developed. A Meteorological Service has been established to satisfy the special and peculiar needs of the Royal Naval Air Services and the Fleet, and now [November 1917] consists of 20 stations with a staff of 31 meteorological officers of commissioned rank and 43 ratings. Its headquarters are at the Admiralty, and the whole service is directly under the Hydrographer of the Navy. A Meteorological Section in the Corps of Royal Engineers has been established at the Headquarters of the Army in France and Saloníka, with reserves and auxiliary establishments at home. One of the main difficulties in connexion with the establishment of these new services has been the lack of an adequate number of trained meteorologists. The Meteorological Office has arranged the personnel of the Meteorological Section R.E., to which 105 officers, non-commissioned officers and men have been appointed. For almost all scientific or technical training has been necessary. At the outset the only professionally trained meteorologists were the members of the scientific staff of the Meteorological Office, very few in number, appointed as superintendents or professional assistants since the re-organisation of the Office in 1905. The first nucleus of the Section was drawn from these, and the rest selected and passed through the Office for training. The technical staff has been provided in like manner.

For the Naval Meteorological Service the Admiralty has also drawn to some extent upon the technical staff of the Office, and others have attended at the Office for professional training. The Office had, in consequence, to meet a large increase of obligations with its trained staff very much reduced, and supplemented by various improvised expedients. These circumstances draw attention to the fact that the Office has been the only school of professional training in meteorology, and emphasize the urgency of the need for more adequate provision in the interest of the meteorological services, not only of this country, the Navy, the Army and the Air Services, but also of the Dominions and Colonies, who ought to be able to find adequately trained men available should they require them.

VIII. *The general lines of reconstruction.*

Bearing in mind the facts which have been set out we may lay down the principle that a proper national organisation for making use of the common experiences of weather consists in :—

1. A systematic collection, partly by telegraph and partly otherwise, of facts as recorded by regular observations, and provision for dealing therewith by means of—

(*a*) A statistical department for the study of "long-period-meteorology" by classifying and ordering the ascertained facts and tracing their statistical relationships in the most effective manner.

(*b*) A forecasting department for the study of short-period phonomena of the atmosphere, dealing with the information received by telegraph.

2. A department of scientific investigation on the basis of the physics of the atmosphere and of the earth in general, which will include a sufficient number of observatories properly equipped and adapted for the purpose, which not only supply information required by the statistical and forecast departments but also initiate researches of their own in meteorology or cognate branches of geophysics.

3. An information bureau that formulates the questions put by those who want information and the answers to be given.

4. A general administrative section for ways and means, organisation, staff and equipment.

IX. *The body of statistics of weather.*

As a part of reconstruction the collection of a body of statistics upon which to base information about climate and weather in the British Isles and the other parts of the British Empire ought now to be systematised. It should be the duty of the local authority charged with the obligations of water-supply, drainage, care of roads and public health, to keep a record for its own purposes of its experience as regards rainfall, temperature, wind, sunshine, fog, &c.—in fact to keep suitable records of weather, not as a contribution to science but as a matter of registration. It should be the duty of a central organisation not only to systematise, supervise, collect and co-ordinate the information obtained by the local authorities, but to supplement them with additional data particularly as regards rainfall, by inviting contributions of observations from water authorities, other landowners and private persons and to present the statistics of weather required by all sections of the community.

Within the term "local authorities" should be included municipal authorities for the British Isles, the Crown authorities for the Colonies and Protectorates and the masters of ocean-going ships. The self-governing Dominions have independent organisations working in co-operation with our own, but this connexion should be strengthened by meetings of the Directors of the Meteorological Services of the Empire, to arrange for co-operation and assistance in attacking effectively the many problems relating to long-period forecasts, climatic changes, rainfall variation, aviation, &c., which await solution. In each Colony one, at least, of the officials whose duties include meteorological observations should have been especially trained as a meteorologist and should devote himself entirely to the control, discussion, and preparation of meteorological information. In the larger colonies more than one meteorologist may be necessary, and it would seem especially desirable that such regions as East Africa, West Africa, West India Islands, &c., should each have a meteorological service which, even if small, should be well organised and efficient, but not left to officials who are already fully occupied with other duties.

This will involve the creation of a certain number of meteorological posts in the Colonial Service, and if the best type of man is to be obtained for them there must be reasonable prospects of an adequate career in the meteorological services in the Empire. With such posts in prospect training in advanced meteorology at Universities should quickly follow.

The collection and presentation of suitable statistics of the distribution of rainfall should no longer be left to a separate institution independent of the Office. They should be made a definite charge upon the Office and provided for either by the incorporation of the work of the British Rainfall Organization with that of the Office upon suitable terms of agreement or, if that is judged to be impracticable, by independent action.

In these departments of meteorological work visitation and inspection from the central establishment are a vital part of the organisation, and in order to secure trustworthy results, which are indispensable for administrative purposes, provision should be made for the visitation even of the remote colonies. Such a visitation is of great advantage to the central organisation as well as to the colonies and stations themselves.

An adequate provision for collecting information from the sea requires the establishment at the chief ports of local offices with a professional meteorologist in charge for the instruction of the officers who observe. Such local offices are also necessary as local bureaux of information.

For the organisation of a body of statistics of meterology for the British Empire the professional staff of the Office would require to be strengthened by the appointment of officers of higher position than that which is provided by the scheme at present in force.

The preservation of an adequate body of statistics also implies the exchange of publications with the self-governing colonies and other countries, and the adequate organisation of a library.

X. *The distribution of current information.*

The next point to which attention should be directed is the use of knowledge of current weather as collected and charted in the Daily Weather Report with an expression of opinion as to future weather which is known as a forecast. The traditional practice in this country has been to distribute the information in the form of lithographed reports, by hand in London and by post in the provinces, or to supply by telegraph a forecast of weather for a day in advance in about 10 words to all classes of the community alike The experience of the supply of information for various naval and military services and the delay and disorganisation of the postal service during the war have made clear :—

(1) That to be of value the information must be adapted to local or special requirements and be placed before the user within three or four hours of the time of observation. This cannot be done effectively for the whole country by a single central office. Local centres of distribution receiving information by telegraph from the central office are necessary, but none are at present in existence except those set up for naval or military purposes during the war. They should be established at various centres, for example, at the chief ports where officers are required for the effective organisation of marine work, and at selected aerodromes for air-work in connexion with commercial aerial transport.

(2) It is not sufficient to put the information into print and presume that the user can adapt it to his own requirements. The offices should be in charge of trained meteorologists who could explain to inquirers the special bearing of the various items of the reports and generally act as local interpreters of technical matters.

In the Colonies it may be safely assumed that the trained meteorologist who was devoting his time to the subject could render great service to the officials of the departments of agriculture, public works, revenue, &c. of colonies besides investigating, in co-operation with other meteorologists elsewhere, the relations in which the climatic phenomena of his region may stand to those of other parts of the world, since it is in this direction that the basis of long-period forecasting must be sought.

XI. *The department of scientific investigation.*

This requires a considerable number of persons with scientific training in physics, mathematics and the theory of statistics, to form a professional staff for the Office, the Observatories and the local establishments controlled by the Office, and for the inspection of stations and other establishments. Before the war, the Office was the only place at which professional training in meteorology could be obtained and the numbers were practically limited to about 20 professional appointments on the staff of the Office and Observatories. The organisation of a scientific staff had only been in operation for about 10 years when the war disclosed the practical demands for a much larger number of experts. The new fact that expert knowledge and training are necessary not only to obtain the information but to impart it to those who are to use it, makes it clear that if the best use is to be made of the

opportunities which a government meteorological establishment affords to all classes of the community, a much larger trained staff must be employed for digesting and expounding the information when it is collected.

This organisation of scientific work both of investigation and of exposition ought to be arranged in association with University provision for teaching. It is not desirable too narrowly to restrict the range of subjects, that is to say the geophysical subjects may be associated with the meteorological work so that a body of persons may be trained ready to join a professional service in the sciences of the air and the earth for service in any part of the Empire.

The members of this staff should pass through all the various departments of the work of the Office. They would naturally begin at the Observatories, and then pass through the statistical department and the bureau of information to the charge of a local establishment and ultimately to the charge of an Observatory or department, or to meet the requirements of the Meteorological Services in other parts of the Empire. For this reason the requirements of a reconstructed service should be considered and a scheme agreed upon before the men who have been in charge of the meteorological work for the services during the war are dispersed to other employments.

XII. *The relation to other Meteorological Services.*

As the subject develops special organisation will almost certainly be called for to meet the special requirements of the Air Services, as has already been found to be the case for the service of the Navy and Naval Air Services. In relation to these the central establishment, as the centre for the general collection of information from this country and abroad, should make all necessary provision for the immediate circulation of any information asked for, in an agreed form. Its statistical and investigation department should also deal with the questions of more general character for which its staff is specially qualified.

It should also arrange, as far as possible in conjunction with the establishments of the Dominions and other countries, for desirable uniformity of methods and instruments, and on that account should continue to be the chief centre for the supply of meteorological instruments to the State departments.

XIII. *Staff requirements.*

In order to meet the requirements herein set out, the organisation of the higher staff of the Office would need revision and an increase of all grades of the technical staff would be necessary. The present staff consists of a Director, responsible to the Treasury through the Meteorological Committee for the whole administration and scientific work and external co-operation of the Office, its observatories and stations. He is assisted at the Office by four superintendents of divisions; at the several observatories by three superintendents of observatories, a University professor of physics, two "meteorologists in charge" and a director of investigation of the upper air; the five-and-twenty stations maintained by the Office are supervised by one of the Superintendents at the Office, the five hundred odd voluntary stations by another. There are two grades of professional assistants in pursuance of a plan in process of organisation when the war began; altogether about 20 persons with academic or professional training are employed: the services of about 40 are required.

What is necessary is more initiative and the means of developing it on the part of the chief officers and, on the part of the direction, more co-ordination for the development of the utilitarian side of the Office work, the application of the information to the use of the Navy, the Army and the Air Services, the Mercantile Marine, the Board of Agriculture, the department of Woods and Forests, the Colonial Office and the Colonies, and Colonial enterprises. Hitherto it has been the practice to compile the necessary information and wait for somebody to ask for it. That is not enough; the information ought to be arranged and pushed forward so that working ideas of the salient features of Climate and Weather should be in men's minds as an essential preliminary when they are considering their plans, instead of being postponed until matured plans await only favourable conditions of weather and climate or being brought in by way of explanation of failure.

The precise form of the organisation should be adjusted from time to time; what is called for in present circumstances is some such arrangement as the following:

1. *A director-general of meteorological services*, who would be in charge of the department of scientific investigation indicated in paragraph XI, organise the disposition of the staff of the various establishments and co-ordinate their work; he would also act personally as adviser on meteorological questions when called upon by any of the departments of the home Government or by Colonial governments in connexion with meteorological services.

A secretary.

2. *A controller of the Meteorological Office*, in charge of the administration and supply services.

A superintendent of instruments.

A librarian in charge of published records.

3. *A director of meteorological statistics*, in charge of a rainfall organisation, with an assistant director of statistics in charge of the study of weather and climate by statistical methods.

4. *A director for dynamical meteorology*, in charge of the regular study of the phenomenon of weather.

5. *Director of the Physical Observatory* at Richmond.

6. *Director of the Aerological Observatory* at Benson.

Superintendent of the Observatory at Eskdalemuir.

Superintendent of the Observatory at Cahirciveen.

Ten senior professional assistants as deputies in training for the assistant directors or superintendents, and three senior professional assistants on research duty with the director-general.

Twenty junior professional assistants. Men who have just taken suitable degrees at a University (at home or in the dominions or colonies), or have otherwise qualified themselves professionally, to train as assistants at the Observatories or the Office, and to form a corps of men duly qualified to take up professional appointments either on the Office staff or in connexion with special departments of work such as the proposed meteorological establishments in connexion with aerial transport or for colonial establishments.

XIV. *Additional accommodation.*

The accommodation at present in the occupation of the Meteorological Office would need to be enlarged to provide for a reorganised service such as that proposed herein. When the present accommodation was provided in 1910, it was contemplated that the top floor, now assigned as temporary offices to the Science Museum, might eventually be used to accommodate a section devoted to British Rainfall. But under pressure of the large extension of the work of reports and forecasts of the daily weather service it has been found necessary to borrow the greater part of that floor for the forecast division. Accommodation equivalent to another floor is necessary, together with a meeting room for lectures and discussions which are an essential part of an organisation of this character.

NAPIER SHAW.

Meteorological Office,
South Kensington, S.W. 7,
28th December, 1917.

The Astronomer Royal, Edinburgh.—*Proposed branch forecast service*—Reported—the following correspondence with the Astronomer Royal, Edinburgh :—

6175.

Royal Observatory,
Edinburgh,
20th December, 1917.

DEAR SHAW,

IN 1915, 30th January and 30th March, we exchanged letters on the subject of securing an early distribution of meteorological forecasts of this locality, but the matter has been allowed to rest owing to existing military regulations. A recent conversation with Major Gold, at the moment on leave in this country, has suggested that a beginning need not be deferred for such reasons.

I gather from Major Gold that it is his practice to issue from headquarters local forecasts for each army in France, which are transferred to a synoptic chart upon the spot. These are found valuable and are appreciated. On the strength of his experience the suggestion is made that a similar forecast should be issued from Edinburgh for the use of the Fleet and the Air Services in Scotland. The idea is that it would be possible to telegraph from London the necessary material for a synoptic chart and forecast ; that a man should be stationed here to draw this chart out and multiply by hand sufficient copies for the services in question. A few particulars of coastal stations could be added and the whole put into the hands that would use it at an early hour of the day while the material was still fresh.

On considering the idea it appears to me so promising that I take occasion to bring it before you at once without waiting for a meeting of the Meteorological Committee or of the Scottish Meteorological Society.

I would add a few comments upon the administrative or other points which the scheme involves as I see it.

1. It would originate within the Meteorological Office and be conducted through the branch office at Edinburgh. Responsibility for the issue would rest with the London staff, the function of Edinburgh at present being merely to translate the material supplied into the most assimilable form and save time in the post.

2. An additional qualified assistant would be required at the Edinburgh office for the purpose. As Major Gold suggested, such a man to start with might best be found by detailing for the service one of his assistants who had already done similar work in France, but one would hope that such assistance need only be temporary, and that after instructions the work could be done locally at moderate cost.

3. I would hope that the service would not end with the war, but be transferred into an organisation for providing the latest possible meteorological information for Scotland.

Yours truly,
R. A. SAMPSON.

Sir Napier Shaw, F.R.S.,
Director,
Meteorological Office.

6418.

Meteorological Office,
South Kensington, London, S.W. 7,
2nd January, 1918.

DEAR SAMPSON,

I AM glad to learn that you have had the advantage of a conversation with Major Gold about the prospects of a local establishment in Scotland for the prompt distribution of weather-intelligence for the use of the Fleet and the Air Services of Scotland. As you know from our correspondence of ten years ago I have always been of the opinion that distribution of information in the manner proposed would be worth the cost and trouble, provided that the service could be made prompt and efficient. The experience of the meteorological establishments in France under Major Gold's command have now shown that it can be so arranged. Gold's D.S.O. and the number of times that officers of the Section have been "mentioned in despatches" show that the military authorities appreciate the services which are rendered in that way. I may add that for the needs of the Fleet and the Naval Air Services a Naval Meteorological Service has been created under the control of the Hydrographer,

which deals in a somewhat similar manner with weather information for the Fleet and the Naval Air Service. It has twenty meteorological stations in various parts of the country and a considerable staff of officers in charge of them.

We have an establishment of our own at South Farnborough and another in process of development in connection with the Royal Engineers on Salisbury Plain, which I expect will become an important local centre for the same purpose.

Some time ago in discussing the meteorological needs of Commercial Aerial Transport I pointed out that local establishments such as that which you have in view would be advisable, and I understood that the Air Board thought that arrangements of some sort for the R.F.C. should be tried at once. Major Taylor was engaged upon them, but I have not heard much about the details, which are really the crux of an enterprise of this kind.

The difficulty of running an establishment of that kind is that it must be regularly, skilfully and efficiently worked, otherwise it will not satisfy anybody. Its activity must be regulated by what is wanted and when it is wanted, not what an "additional assistant" with ordinary office hours is in a position to supply. According to the practice with the Armies on the Western Front you would require two commissioned officers (captain and subaltern) and say four N.C.O's. The two officers must be men with preliminary training in mathematics and physics and special training in meteorology and the work of forecasting; besides that they must keep their attention constantly on the local weather as a datum point for fixing ideas about the map by running a local "station," otherwise they do not get enough grip of the situation. So there is some regular auxiliary work which must be done. Besides the duty of compiling a map and adjusting a general inference to local requirements there must always be somebody at a telephone receiving or transmiting messages or ready to receive inquiries and reply to them. Making allowance for irregular hours, leave of absence, sickness and the like, I doubt if you could do with a staff of less than six all told for your establishment. That means, of course, men and money.

To turn to ways and means, I do not think at this stage of the war I could put the proposal forward on my own initiative as a civil establishment and offer to supply information to the Fleet and the Air Services. As regards the Fleet the position is that the Naval Meteorological Service tells me what is required of us for their use, and if the Fleet requires information in Scotland the application must come round that way. There are no civilians left to staff a new establishment; we are already sorely distressed to keep the Office establishment going at all, using women and girls as far as possible. You cannot by general ordinance run a small mixed staff on the irregular hours of a forecast service. You may put an officer in charge and let him find his own assistants where he can, but that won't do when you contemplate borrowing an officer for a time from France and replacing him from time to time. The responsibility for harmonious working and the reverse then passes upwards.

So if the experiment of a local establishment in Scotland is to be tried, as I certainly think it ought to be, it must be on a service basis, and in that case the initiative must come from the Admiralty, the War Office or the Air Service, not from me, because the provision of the necessary staff has passed beyond my control. It would, of course, be quite proper for Major Gold to lend one of his experienced officers for a start, but the transfer would require War Office sanction, and it would fall to Major Lyons, who is in general charge of Meteorological Section R.E. for the War Office, to supply the vacancy on the Western Front, and already the Section is shorthanded. As I have said, if the Fleet wants more meteorological information, it must represent its wants at Headquarters, and the Naval Meteorological Service will look after it, making use of this Office for any services which we can render; and if the Air Service wants meteorological information, it should move the Air Ministry to notify this Office or the War Office. If the application came to me, I think my proper course would be to ask the Royal Engineers to provide the men as a war service because I have no means of obtaining civilian staff—and for this reason—you must have young and active men for the strenuous and responsible work that is implied in keeping the war services supplied with information upon which they are going to take action. You cannot work with a small staff of people liable to give way under strain—the burden on the rest of the staff is too great. Nor can you train men as forecasting officials who have passed the military age. They must have a basis of sound knowledge of mathematics and physics when they have to deal with a logarithmic medium like the atmosphere in the wide sense, and men who have those qualifications at the age of 45 are professional mathematicians or physicists who would find meteorological practice intolerable. Having spent their lives in keen criticism of the processes of deduction or experimental verification they would find the issue of inferences drawn from a meteorological map as incongruous as being suddenly transferred to a stockbroker's office.

All I can do, therefore, at this stage is to put your letter before the Meteorological Committee, upon which the Admiralty and the War Office are represented, and ask their advice as to the course to be pursued.

Yours sincerely,
NAPIER SHAW.

Professor R. A. Sampson, F.R.S.,
Royal Observatory, Edinburgh.

The correspondence was considered in conjunction with the Memorandum on Office-Organisation of Minute 675; and it was agreed that immediate steps be taken to organise a branch office in Edinburgh as suggested by Professor Sampson.

675. OFFICE STAFF.—**Office Organisation.**—Reported—the following memorandum by the Director:—

OFFICE ORGANISATION.

In a memorandum on the organisation of the Meteorological Service approved by the Committee for submission to the Ministry of Reconstruction it is suggested that for the direction and administration of the Office there should be (1) *a director-general of the Meteorological Service* (with the

necessary personal secretarial staff) who would organise the disposition of the staff of the various establishments and co-ordinate their work. He would be in charge of the department of scientific investigation indicated in the memorandum which includes the supervision of the work of the observatories in the auxiliary subjects of terrestrial magnetism, atmospheric electricity and seismology, and he would also act personally as adviser on meteorological questions when called upon by any of the departments of the Home Government or by Colonial Governments in connexion with Meteorological Services, and (2) a *controller of the Meteorological Office* in charge of the administration and the supply services which include (*a*) the supply of instruments for various meteorological services through the Instruments Division, (*b*) the supply of daily reports to various services through the Forecast Division and of statistical reports through what are now the Statistical and Marine Divisions, and (*c*) the bureau of information which deals with the replies to inquiries of various kinds from Government departments, foreign countries and the general public, the exchange of publications and formation of a body of material for reference now associated with the Library.

This suggestion is put forward on account of the great increase of the demands upon the administration in respect of qualified staff for various services and especially upon the Instruments Division, the work of which has increased fourfold, and upon the Inquiry department and the Statistical Division, and the Publication Department.

With our present organisation the Director is personally responsible for these items including finance for which he is the accounting officer, and including also the preparation of the work for the Committee in accordance with the Treasury Minute of May 20, 1905 and orders consequent thereupon. To the work of general administration has been added since the war began the organisation of the staff and meteorological side of the work of the Meteorological Section R.E, which now includes more than 100 officers and men and is to be still further increased by the organisation of a Home Unit.

Since 1910 the work has been quite sufficient for a Director with the aid of a personal secretary trained in the professional subjects to be dealt with and when the exigencies of office work required the secretary's services elsewhere the provision had already become inadequate soon after the beginning of the war. It would have broken down altogether in the subsequent developments but for the fact that Major Lyons (a member of the Committee representing the Royal Society) was detached by the War Office for duty at the Meteorological Office, originally for work on the Mediterranean by arrangement with the Committee of Imperial Defence and subsequently also for the military supervision of the Meteorological Section R.E., and as representative of the War Office on the Committee.

The work of the Office has therefore been kept going by an informal arrangement sanctioned by the Committee whereby Major Lyons has taken over a large part of the administration, such as staff, office-organisation, correspondence, ordinary inquiries, instruments, as well as the management of the Meteorological Section R E. and its developments; while the Director has retained accounts as the accounting officer, and statistics and marine by a species of habit, as well as certain special inquiries and occasional publications. Since the war began the observatories (temporarily as was supposed) have had to make the best of the difficult circumstances without the usual visitation of the Director, and that condition ought now to be remedied.

Further developments are now in prospect which make it desirable to bring into operation forthwith an arrangement on the lines of the proposal in the memorandum on reconstruction. The Meteorological Section of the Royal Engineers is to be increased by a unit for service in this country, which must be considerable. The demand for fresh organisations for the distribution of information is growing rapidly and ought not to be repressed. It is known that the new Air Ministry will require for its own purposes a meteorological organisation more extensive than any meteorological unit which exists at present either within the Office or outside of it, and the proper organisation of the arrangements between the Office and the Ministry will require most careful handling. On all sides is a demand for an authoritative book setting out the facts and principles of meteorology including the more recent results of the upper air for the instruction of the large number of new meteorological officers of the Service, who at present can only be referred to introductory text-books which are insufficient or to innumerable official publications and scattered papers in scientific periodicals. It may be described as the most urgent meteorological need at the moment. The Director's experience in all branches of the work make it peculiarly his duty to meet this demand, but to do so needs much greater sense of freedom from the details of administration and official duties than is possible with the present informal arrangements. So long as no definite provision is made the responsibility for any emergency that arises remains a personal one that can only be satisfied by being always within reach.

It is therefore desirable to obtain permission to bring in at once the arrangement foreshadowed after the war in the memorandum on reconstruction and to arrange for the appointment of a Controller under that scheme, if Major Lyons is willing to accept the duty. He is at present acting under the orders of the War Office and it would be necessary to obtain permission from the War Office for him to be employed as Controller and to obtain permission from the Treasury for a suitable salary to be assigned to that post. It would be in the highest degree undesirable that he should not continue to supervise the Meteorological Section R.E., and authority should be given to represent to the War Office that suitable rank should be assigned for securing an appropriate organisation.

If these arrangements be approved it would devolve upon the Committee to arrange for supplementing the military pay of the Officer in charge of the Meteorological Section R E., or providing in some other way a salary reasonably commensurable with the responsibility of the duties.

The proposal forms part of a scheme of reconstruction after the war, so that it is not based entirely upon temporary urgency. An appointment under it should be for the duration of the war. It will be remembered that the term of the Director's appointment lasts only until 31st March, 1920. If the proposal is adopted some changes of habit and practice would naturally come in and it would not be desirable to change over again within the two years.

In view, however, of the fact that the distribution of duties might need reconsideration in view of a new appointment the period until 31st March, 1920, or for the duration of the war would be a suitable specification of the limit of tenure.

(Signed) NAPIER SHAW.

January 12th, 1918.

Mr. Barstow reported that a proposal was before the Chancellor of the Exchequer for the transfer of the office as a whole to the new Air-Ministry with the least possible delay. It was based upon a memorandum by General Sir David Henderson setting out the necessity in any case for a large meteorological organisation in connexion with the combined Air Services. Opinions were expressed to the effect that the attachment of the National Meteorological Service to one department of State would be ultimately prejudicial to other departments concerned. After some discussion the Director was requested to prepare a statement setting out the alternative policy of retaining the National Service dependent directly on the Treasury, and providing the means of satisfying the meteorological requirements of the several departments by a suitable organisation of the distribution of information and of the professional staff.

The suggestions contained in the Director's memorandum were approved, and it was agreed to apply to the Treasury for authority to proceed.

War Bonus.—In accordance with the instructions of Treasury circular letter 42828/17 of 24th December, 1917, authorising new scales of war bonus for the employees of Government in pursuance of Awards Nos. 17 and 18 of the Conciliation and Arbitration Board for Government employees, it was agreed, subject to Treasury sanction, if necessary, to allow war bonus to employees on the Office staff at the following rates in lieu of the rates authorised by Minute 638.

	Employees of 18 years of age and upwards.		Employees under 18 years of age.
	Men.	Women.	
Remuneration not exceeding 40*s.* a week	14*s.*	9*s.*	7*s.* a week.
„ exceeding 40*s.* but not exceeding 60*s.* a week	13*s.*	8*s.* 6*d.*	6*s.* 6*d.* a week.
„ exceeding £156 10*s.* but not exceeding £226 13*s.* 4*d.* per annum.	£34 per annum.	£22 13*s.* 4*d.* per annum.	
„ exceeding £226 13*s.* 4*d.* but not exceeding £250 per annum.	15 per cent. of salary.	10 per cent. of salary.	
„ exceeding £250 but not exceeding £312 10*s.* per annum.	£37 10*s.* per annum.	£25 per annum.	
„ exceeding £312 10*s.* but not exceeding £350 per annum.	12 per cent. of salary.	8 per cent. of salary.	
„ exceeding £350 but not exceeding £420 per annum.	£42 per annum.	£28 per annum.	
„ exceeding £420 but not exceeding £500 per annum.	10 per cent. of salary.	6·6 per cent. of salary.	

subject to the following provisions :—

(1) Persons who have been engaged since the war began and are still engaged at rates of pay adjusted by war bonus or otherwise to war conditions will receive the difference between the scale authorised by Treasury letter of 1st June, 1917, and now operative as from 1st January, 1917. for permanent employees (Circular, 1st June, 1917. 4).

(2) In view of the varying conditions in different parts of the Kingdom, the allowances on account of war bonus for the establishments in the country are at the discretion of the Committee, and must be severally authorised (Circular letter 23599/16. 3 (*b*)).

(3) As part-time employees engaged on manual duties may be allowed such proportion of the war bonus payable to full-time employees as their ordinary hours of work bear to full-time employment, Cleaners should be allowed four-tenths of the war bonus.

(4) The war bonus will be operative in the case of the salaries of married men serving with the forces (Major Gold, Pte. Tomkins).

(5) Superintendents whose salaries exceed £500 a year will receive £550 a year.

Honours List.—Reported—that *Mr. R. G. K. Lempfert*, Superintendent of the Forecast Division, had been appointed Commander of the Order of the British Empire in recognition of services rendered during the war.

It was agreed to send a letter to Mr. Lempfert congratulating him on the honour conferred.

Obituary.—*Mr. W. H. Parsons.*—Reported—the receipt of letter (M.O. 5323/1917) of 1st December, 1917, from the Cane Hill London County Asylum, notifying the death on 30th November, 1917, of Mr. W. H. Parsons, late senior Office Keeper. In these circumstances the provisions of Minute 567 became inoperative and the endowment assurance policy, of the value of £199, became the property of Mr. Parsons' executor.

Approved.

Mr. J. E. Cullum.—Reported—the receipt of letter 391/1918 from Captain S. J. Cullum, notifying the death on 11th January, 1918, of his father, Mr. J. E. Cullum, formerly Superintendent of Valencia Observatory. Mr. Cullum retired on the 1st May, 1915, and had since been in receipt of a pension of £143 10*s.* per annum.

It was agreed to send a letter of condolence to his widow.

Mr. J. Fisher—Reported—the receipt of a notification 889/1918 of the death of Mr. J. Fisher on 16th January, 1918. Mr. Fisher had been observer at St. Aubin's, Jersey, since 1877, and his son was now continuing the observations.

Mr. Fisher's death raised the question of the adequate provision of observations from Jersey. The present arrangements included observations reported from St. Aubin's in the day time, the care of a sunshine recorder by the Signal Station at Fort Regent, and the publication of data from St. Louis Observatory. It had been impossible to obtain 1 a.m. reports from Jersey, and these had had to be arranged with Fort George, Guernsey. It was now proposed to come to a better arrangement for providing for the whole of the work at one station.

It was agreed that it would be best, if possible, to arrange for all the observations to be taken and reported from the St. Louis Observatory.

New Appointments.—Reported—the following Director's orders for confirmation :—

No. 654 appointing *Miss M. L. Pickthall* temporary assistant in the Library Section at a salary of £2 per week. The appointment dates from 17th December, 1917.

No. 655 appointing *Miss A. L. Sanford* temporary clerk in the Instruments Division at a salary of 25*s.* per week. The appointment dates from 27th January, 1918.

2nd Lieutenant L. B. Cundall, R.E.—Reported—that the War Office had offered the services of 2nd Lieut. Cundall temporarily. He would be attached to the Forecast Division, and a report on his work was to be forwarded to the War Office at the expiration of two months.

Approved.

676. PUBLICATIONS.—**Special Weather Report B.**—Reported—that in accordance with Minute 668 authority had been obtained to reproduce by lithography Special Weather Report B, issued at 11.30 a.m., to naval, military and other official addresses. The Report had been lithographed since 17th December, 1917, and its usefulness had been much enhanced thereby.

Calendar for 1918.—Reported—that the printed-off copies had been delivered to the Stationery Office on 18th January.

Réseau Mondial, 1910.—Reported—that the preparation of the data had been completed, and the copy was now in the press.

Handbook of the Weather of the British Coasts.—Proof copies were laid on the table.

Cost of Printing 1916–17.—Submitted—the following comparison of the sales of publications and the cost of printing for 1916–17, which had been supplied by the Stationery Office. The sales of the Seaman's Handbook were especially noteworthy, compared with those for previous years.

AMOUNTS RECOVERED BY SALES OF PUBLICATIONS ISSUED BY THE METEOROLOGICAL COMMITTEE.

1915–16.			*Sales through Stationery Office Agents.*	1916–17.		
£	*s.*	*d.*		£	*s.*	*d.*
33	11	8	Weekly and Monthly Weather Reports	25	7	0
14	7	0	Meteorological Charts of the North Atlantic Ocean	11	6	8
7	16	4	„ „ „ Indian Ocean	4	14	0
1	3	7	Annual Report of the Meteorological Committee		4	8
	—		Barometer Manual, 1916 Edition	43	1	4
56	18	7		84	13	8
			Publications issued prior to 1915–16 :—			
17	17	4	Barometer Manual, 1912	4	7	4
2	8	0	Seaman's Handbook of Meteorology	110	9	4
3	16	0	Marine Observer's Handbook	10	12	0
14	6	0	Observer's Handbook	22	2	0
	17	0	Miscellaneous...	1	14	7
96	2	11		233	18	11
70	1	5	Sales of Publications and Forms by M.O.	59	1	10
35	19	0	Sales to the Royal Meteorological Society and the Scottish Meteorological Society of Monthly Weather Reports (approximate)	50	0	0
202	3	4		343	0	9

STATEMENT SHOWING THE ESTIMATED EXPENDITURE BY H.M. STATIONERY OFFICE FOR PRINTING, STATIONERY, &C., FOR THE METEOROLOGICAL OFFICE.

——	Printing.	Paper.	Binding.	Books and Stores.	Total.
	£	£	£	£	£
1915–16	1 500*	480*	150*	170	2,300*
1916–17	1,700*	760*	180*	130*	2,770*

* These amounts include the cost of copies of Official Publications supplied for Departmental purposes.

Congestion of work at M.O. Press.—Reported—that owing to the extra work entailed in the preparation of Report B, and other demands on the M.O. press, the preparation of illustrations for M.O. publications was in arrear, and it had been necessary to apply to the Stationery Office for further facilities. Another printer had recently been obtained so that two machines might be in operation at the same time, and it was anticipated that the work would be kept more nearly up to date in the future.

Captain Harvey reported that the Marine Department of the Board of Trade was in urgent need of copies of the Seaman's Handbook for the use of their examinees. 10,000 copies were on order, and it was agreed to demand another 10,000 immediately and to make further orders as soon as the 20,000 copies had been printed off.

677. ESTIMATES FOR 1918–19 (Minute 669).—Reported—the receipt of the following letter (M.O. 578/1918) from the Treasury :—

43850/17.

Treasury Chambers,
7th January, 1918.

SIR,

I HAVE laid before the Lords Commissioners of His Majesty's Treasury your letter of the 19th ultimo (6065) transmitting the draft Estimates of the Meteorological Office for the financial year 1818/19.

In reply I am to inform you that in the circumstances represented My Lords concur generally in the proposals now before Them, and They agree with the Committee's view that it will be preferable to meet exceptional expenditure on salaries and telegrams directly attributable to the war out of the Vote of Credit rather than endeavour to adjust the grant-in-aid. They accordingly propose to ask Parliament to vote an inclusive grant of £22,500 in aid of the expenses of the Meteorological Office for 1918/19, and They will, if necessary, be prepared in addition to make advances from the Vote of Credit up to a sum of £7,000 for the year in respect of exceptional expenditure of the nature above indicated.

My Lords note that the estimated cost of salaries in the Forecast Division has risen to £4,120, and They trust that every effort will be made to keep the cost of this service as low as possible compatible with efficiency, and They agree that the special subvention of £250 a year hitherto received from the Advisory Committee for Aeronautics from special experimental researches in meteorology undertaken by the Director for the Advisory Committee should now be discontinued.

I am, &c.,
T. L. HEATH.

The Director, Meteorological Office,
South Kensington, London, S.W. 7.

The Director pointed out that the salaries in the Forecast Division, amounting to £4,120, included the payment of two men past the age of retirement, who were unable to take their full turn of duty; one professional assistant who had now left the Office, and one who was now at South Farnborough; and four men who were serving with the colours and whose military pay was made up by the Office to their civil pay.

678. STATIONS.—**Bidston Observatory.**—Reported—the receipt of letter 578/1918 from the Mersey Docks and Harbour Board, asking that payment might be made for the taking and reporting of observations at 1 a.m., and suggesting a remuneration of £50 per annum, to be made to the Assistant-Director of the Observatory.

Daily telegraphic observations had been received from Bidston Observatory since the initiation of the service by the Office; but the 1 a.m. observations had only been required since December, 1917, when the French authorities had asked for them; they were not essential for the Meteorological Office working charts.

The following letter was approved (M.O. 1315/1918):—

SIR, 29th January, 1918.

I HAVE brought your letter of January 11th before the Meteorological Committee and called their attention to your suggestion that the Office should make a grant at the rate of £50 a year for the Assistant Director of the Observatory of your Board at Bidston in consideration of the extra work entailed in obtaining and forwarding observations at 1 a.m.

The Committee note that they have had the advantage of the co-operation of your Board's Observatory in the work of the Daily Weather Service for many years without any payment being made for it, and they wish to express to you their appreciation of the service that your Board has thus rendered to the work of this Office, which was originated in the interests of shipping and is now recognised as being of interest to all sections of the community.

This Office maintains eight observatories of its own, and provides for telegraphic reports from 23 stations, exclusive of Bidston and a few others which contribute the observations in like manner. The paid stations are chiefly Coast Guard Stations and Lighthouses at selected points on the Coast where there are men who can take on the work of observing as extra duty without interfering with their regular work.

A scale of pay has been worked out in the course of the 57 years since the service began that is based upon the idea that the work of observing can be done without any serious addition to the observer's ordinary duty. The 1 a.m. service has been running now for more than three years at those observatories and stations where it could be managed. We have not expected 1 a.m. duty from places where it would mean a special and separate attendance. Bidston was added to the list from December 1st because Liverpool was included in the list of places asked for by the Admiralty for the French authorities.

The additional report appears to be a more serious charge upon the time of the staff of the Observatory than was anticipated. We should find £50 a year rather serious, not of course as remuneration for the extra work of the Assistant Director of an Observatory, but as a precedent for a special payment for the observations at 1 a.m., because the addition to duty has been accepted during the past three years at most of the stations without remark or as an extra bit of war service; where it has been taken into account the whole payment for duty at the station (7 a.m., 1 p.m., 6 p.m., and 1 a.m.) works out at far less than £40 a year. This amount will, no doubt, strike you as small, but then we have always sought arrangements that made little demand on the observer's time.

The 1 a.m. service has now become one of the chief services of the day, but I should not press for 1 a.m. reports from Bidston for our own map if there is serious difficulty, in view of the fact that we have observations reported from Holyhead to the west and Barrow to the north. On the other hand, every additional station of a trustworthy character is an advantage and you might like the Observatory to share in the work.

The Committee think that your point would be met if they offer £50 a year in consideration of the whole trouble of taking and telegraphing observations from Bidston to this Office, without any distinction between 1 a.m. observations and others.

The sum would be available for the staff of the Observatory, distributed as you or the Director might think fit.

The Committee would like your view on that before representing the matter to the French authorities.

I am, &c.,
NAPIER SHAW.

The General Manager,
Mersey Docks and Harbour Board,
Liverpool.

679. OBSERVATORIES.—**Eskdalemuir.**—*Installation of magnetographs.*—Reported—that the magnetographs removed from Falmouth (Minute 670) were in process of installation at Eskdalemuir in the west room of the Underground Magnetic Chamber, and would shortly be in working order.

Handyman.—Reappointment of J. Stoddart.—Reported—that after the employment of a temporary assistant for two weeks, J. Stoddart had applied for reappointment, and had been engaged on the same terms as previously, viz., 25*s.* a week, plus war bonus.

Approved.

680. METEOROLOGICAL SECTION, R.E.—**Establishment in Italy.**—Reported—that in accordance with War Office instructions, a detachment of the Meteorological Section, R.E., consisting of 2 officers and about 20 men, had been detailed for work with the British Army in Italy.

Increase of Home Section.—Reported—that a considerable increase in the Meteorological Section, R.E., in England was in contemplation; and that two new stations, at Shoeburyness and Stonehenge—Salisbury Plain, were in process of formation.

Mentions in Despatches.—Reported—that the following officers had been mentioned in despatches:

Salonika force: Captain E. M. Wedderburn, R.E.
Western Front: Major E. Gold, R.E., D.S.O.
Lieut. (now Captain) J. W. Bispham, R.E.
Lieut. (now Captain) E. H. Chapman, R.E.

681. INSTRUMENTS.—**Supplies to Admiralty.**—Reported—the receipt of letter (M.O. 5618/1917) from the Treasury, as follows:—

40354/17.

Treasury Chambers,
8th December, 1917.

SIR,

I HAVE laid before the Lords Commissioners of His Majesty's Treasury the memorandum as to the proposed alteration in procedure relating to supply of meteorological instruments to the Admiralty submitted with your semi-official letter of 6th ultimo (4207).

In reply I am to inform you that, subject to the concurrence of the Lords Commissioners of the Admiralty (to whom copies of the memorandum and of this letter are being furnished) My Lords approve of the proposal that the Meteorological Office should purchase supplies of instruments and maintain stock as necessary and supply to the Admiralty as well as to other Departments on requisition as necessary, at an all-round price assessed at prime cost plus 5 per cent. charge for office, &c., expenses; and the annual allowance of £100 now paid by the Admiralty to the Meteorological Office should lapse.

I am, &c.,
ROBERT CHALMERS

The Director,
Meteorological Office.

The proposal was approved.

682. DIRECTOR'S REPORT AND ACCOUNTS.—**Reports.**—*Installation of additional telephone line.*—Reported—that in accordance with Minute 672 an additional telephone line had been installed on 22nd December, 1917, and that the Office telephone numbers were now 5810, 5811, 5812; the number 5813 being reserved for possible future requirements.

Reported further—that in consequence of the congestion of the telephone lines during air-raids it had been found necessary to provide a *private line* between the Office and the Central Telegraph Office for use during air-raids so that the work of the Forecast Service might not be interrupted. A private line had therefore been installed in Room 9, on the lowest floor occupied by the Office; the other two exchange lines being connected in times of raids to the two adjoining rooms, so that the work could be continued with the minimum delay possible in the circumstances.

Approved.

Conference on Weather Reports.—Reported—that a second conference on the terms and symbols used in the Office Weather Reports had been held on December 17th, 1917, when it had been decided to indicate the direction of the wind according to azimuth in degrees from true North. It was understood that this system was already being used for observations at sea, and it was agreed to instruct the telegraphic reporting stations to adopt the method as soon as arrangements could be made for making suitable orientation marks at the stations. Questions of terminology in weather reports were also discussed, and it was suggested that conventions as to the exact meaning of the words and phrases used would be desirable to avoid ambiguities.

Substitution of gas for coal fires at the South Kensington Post Office.—Reported—that on receipt of a circular letter from the Office of Works regarding the necessity for economy in the use of coal, the Director had pointed out that the consumption of coal in the Office was practically nil, but that the Post Office in the same building used coal extensively, to the detriment of the Office observatory on the roof. The Office of Works had recently sent a representative to inform the Director that three of the four coal fires in the Post Office had been replaced by gas-fires, and the question of the fourth, which was used for drying purposes, was temporarily in abeyance.

E. G. Bilham.—Suggested communication to "Nature" on the influence of weather on shipping losses.—Reported—the receipt of a communication from Mr. E. G. Bilham, professional assistant in the Forecast Division, submitting a correlation of shipping losses with changes in the weather.

It was agreed that it was not desirable to send such a communication to a periodical, and that, if any use were to be made of it, it should be sent to the Admiralty for their disposal.

Accounts.—Submitted—the following Statement of the Bank Account in the Cash Book :—

	£	s.	d.
Balance on 27th November, 1917	3,850	1	7
Receipts from 28th November, 1917—22nd January, 1918	7,969	17	7
	11,819	19	2
Cheques drawn from 28th November—22nd January, 1918	7,909	2	6
Balance on 22nd January, 1918	£3,910	16	8

Submitted—The following Statement of Accounts for the nine months ended 31st December, 1917, prepared for audit by the Comptroller and Auditor-General:—

RECEIPTS.							PAYMENTS.					
1916. £ s. d.		£ s. d.		1917. £ s. d.			1916. £ s. d.		£ s. d.		1917. £ s. d.	
2,208 15 5	Balance from year 1916–17	—		2,047 13 5			750 0 0	Director...	—		750 0 0	
16,875 0 0	Parliamentary vote..	—		16,875 0 0				OFFICE SALARIES (including Insurance):				
							6,939 2 9	Monthly	8,443 8 8			
	DEPARTMENTAL EXPENSES REPAID:						1,214 19 0	Weekly	1,567 11 1			
2 0 6	Forecasts, &c. ...	1 13 0									10,010 19 9	
49 7 1	Marine, Statistical, and Administrative	50 16 8					346 0 11	EXPENSES OF OFFICE: Rent, Heating, and Lighting	518 12 8			
							82 2 9	Furniture and Equipment	33 3 2			
63 10 11	Instruments ...	241 19 2										
				294 8 10			19 3 7	Library	17 4 0			
	INCIDENTAL EXPENSES REPAID:						73 5 11	Insurances and Repairs	3 18 9			
60 19 10	D.W. Report ...	71 1 5					182 15 0	Incidental Expenses, and Consumable Stores	162 12 1			
64 16 10	Divisional... ...	51 13 6										
4 17 7	Advertising Account	7 13 11					5 12 6	Advertising Account ...	5 12 6			
				130 8 10							741 3 2	
							431 5 2	POST OFFICE: Postage	484 6 11			
40 18 10	STATIONERY OFFICE	—		66 5 5			92 1 2	Telephones	102 7 7			
567 14 5	TELEGRAPH CHARGES REPAID	—		1,619 14 3			2,154 5 4	Telegrams	3,020 13 0			
											3,607 7 6	
1 0 8	TELEPHONE CHARGES REPAID	—		1 11 11			70 1 5	STATIONERY OFFICE ..	—		64 1 4	
							203 3 1	TRAVELLING EXPENSES	—		113 13 2	
148 0 0	INSPECTIONS ...	—		106 9 6				SUPERANNUATION:				
							105 8 4	Pensions not chargeable on Fund ...	18 15 0			
	INSTRUMENTS:											
2,012 19 0	Royal Navy ...	2,418 19 7					206 14 0	Pensions chargeable on Fund	206 14 0			
2,061 8 5	By sales from Stock	3,523 9 6										
				5,942 9 1			421 17 6	Annuities	421 17 6			
							—	Contribution to fund	—			
	SUPERANNUATION ACCOUNT:										647 6 6	
433 2 6	Annuities	421 17 6						COST OF INSTRUMENTS:				
32 2 2	Interest on Investments	46 2 5					3,253 13 4	Royal Navy	2,404 12 7			
				467 19 11			289 3 0 / 3,754 17 1	For Stock	5,254 11 4			
											7,659 3 11	
	*OBSERVATORIES, BRANCHES, AND STATIONS:							*OBSERVATORIES, BRANCHES, AND STATIONS:				
464 2 8	Richmond... ...	342 15 7					1,605 6 1	Richmond	1,657 0 10			
1,016 1 6	Eskdalemuir ...	1,014 4 2					1,203 15 2	Eskdalemuir	1,234 16 8			
23 19 5	Cahirciveen ...	21 11 0					528 12 5	Cahirciveen	553 3 9			
277 13 0	Farnborough ...	305 10 9					458 15 5	Farnborough	386 13 3			
10 10 6	Falmouth	10 14 4					212 13 10	Falmouth	258 1 6			
10 0 0	Benson	—					329 8 7	Benson	413 18 9			
—	Edinburgh ...	—					286 3 0	Edinburgh	277 2 3			
—	Atmos. Pollution..	500 0 0					—	Atmos. Pollution ...	142 18 6			
60 17 3	Miscellaneous ...	88 17 5					1,061 10 8	Miscellaneous ...	1,046 11 4			
				2,283 13 3							5,970 6 10	
—	Fire Insurance ...	—		2 12 6							29,564 2 2	
—	Less War Loan subscriptions included in balance on 1st April, 1917 ...	97 16 0		29,838 6 11			—	†LESS WAR LOAN SUBSCRIPTIONS ...	—		17 0 0	
											29,547 2 2	
								BALANCE:				
							142 15 1	Cash at Bank... ...	100 19 2			
—	Add unexpended subscriptions ...	1 8 0					85 6 5	,, at Office ...	93 17 7			
				96 8 0							194 16 9	
£26,489 18 6				£29,741 18 11			£26,489 18 6				£29,741 18 11	

* For details, *see* separate statement. † Deductions from Salaries during December; lodged with Bank on January 2nd

Statement of Assets and Liabilities at 31st December, 1917.

LIABILITIES.					ASSETS.			
£ s. d.		£ s. d.			£ s. d.		£ s. d.	
3,405 3 7	To sundry creditors	5,451 15 10			228 1 6	By cash at Bank and at Office ...	194 16 9	
181 8 6	,, superannuation	357 18 6			8 18 8	,, salaries reserved (premiums) ...	11 8 1	
2,221 9 11	,, balance	2,695 3 3			417 14 2	,, M.O. instruments in stock	2,502 6 0	
					1,202 8 11	,, sundry debtors	2,494 2 0	
					3,950 18 9	,, Admiralty	3,302 4 9	
£5,808 2 0		8,504 17 7			£5,808 2 0		8,504 17 7	

NOTE.—On 31st December the amount of Government securities held for the provision of Superannuation Annuities was £26 14*s.* 2*d.* 2½ per cent. Consols, and £989 9*s.* 6*d.* 5 per cent. War Loan.

EIGHTY-THIRD MEETING.

South Kensington, S.W.7, 20th March, 1918.

PRESENT :

THE DIRECTOR, IN THE CHAIR.

THE HYDROGRAPHER. | MAJOR LYONS.
DR. SCHUSTER.

683. The Minutes (673–682) of the last Meeting (23rd January, 1918), previously circulated, were taken as read, and confirmed.

The Minutes (664–672) of the Meeting of 28th November, 1917, previously circulated in revise, were taken as read and confirmed.

684. CORRESPONDENCE.—**Treasury.**—*Proposals for Re-organisation.*—Reported—that in accordance with Minute 675 the following letter had been sent to the Treasury :—

1546

DEAR BARSTOW, 1st February, 1918.

THE Meteorological Committee at their Meeting on the 23rd January last considered the proposal which you mentioned as having come before the Treasury that the Meteorological Office should be transferred to the Air Ministry with the least possible delay.

The Committee had no difficulty in acknowledging the force of the considerations set out in Lord Rothermere's letter and Sir David Henderson's memorandum. They agreed that the creation of a professional meteorological organisation on the scale necessary for the Air Service to act independently of the Meteorological Office might lead to serious difficulties and would be uneconomical generally ; and they recognised that there is a situation which must be met in one way or the other by prompt action. Members of the Committee representing Government departments were of the opinion that on general grounds the independent position which the Office now holds is the best in the general interest, and that, whatever might be the intention at the outset, if what is now the common Central Office passed under the control of one of the departments of State the interests of the other departments would, in the long run, almost certainly be prejudiced.

The point requires most careful consideration, because behind the departments concerned are the interests of the corresponding classes of the general public whose needs the Meteorological Office has always kept in view in the arrangement of its work. Thus behind the obvious and vital interests of the Fleet, represented by the Admiralty, and of the Mercantile Marine, represented by the Board of Trade, are those of the shipping community in general as well as those of Railway Companies and travellers by land and sea. Behind the interests of the Board of Agriculture are the interests of farmers, market gardeners, fruit growers, foresters and landowners. These, with the War Office, are the Government departments already represented on the Treasury Committee which controls the Office, and besides the occasional interest of judges, lawyers and litigants, there are two other departments representing the interests of large sections of the community, namely, the Local Government Board, representing Public Health, Water Supply, the Surveyor and Engineer ; and the Colonial Office representing the administration of the Colonies and the development of their natural resources, with all the public interests that attach to these enterprises. So also behind the immediate interests of the Air Ministry are the interests of the general public in relation to aerial navigation, and while the Committee recognise that these last items are novel and most impressive in their present importance and in the rapidity of their certain growth, and especially in the urgency of their requirements in war time, they do not regard the older interests which are also in the long run of far-reaching national and imperial importance as being permanently subordinate to the interests of the Air Ministry or the public interests which that Ministry stands for.

In view of the fact that the necessities of the air services now being organised must be met and that in the long run they might overshadow the interests represented by other Government Departments if all the activities of the Meteorological Office were controlled by the Air Ministry, the Committee desired me to make out for your information a statement of the alternative which would represent the development of the organisation of the Meteorological Office on its present lines of independence, not as an expression of opinion on my part nor on the part of the Committee, but in order to ascertain whether development on the lines hitherto approved by Government, and followed by the Office with success, could meet the requirements of the Air Ministry.

The present position of the Meteorological Office.

In order to do this I ought to point out what is the basis of the present organisation of the Meteorological Office. It has two sides, one the side of scientific investigation, which is quite

unrestricted by any consideration of the practical value of the result of the investigation to any particular department—the Meteorological Office vote is a grant-in-aid for scientific investigation; the other is the utilitarian side—the supply of approved instruments to observers, information, forms, &c., to public departments and private inquirers.

Scientific Investigation.

For the first, free public discussion and free scientific criticism are absolutely essential. It is the Royal Society, to which are added now the Royal Meteorological Society and other scientific societies interested in the atmosphere, that the staff must look for reputation and public recognition of their scientific merits. This is a necessity which has its advantages. Weather-wisdom goes back long before the establishment of the Meteorological Office, and the weather-expert with unexplainable powers is not even now extinct. The best evidence of the success of our organisation of the meteorological service during the war is that even under the stress of campaigns in many quarters of the globe no question has been raised on the practical side about the scientific method employed: it has been accepted without question, yet many alternatives have been offered, and the only criticism that we use or can use is that the method should pass the ordeal of description and discussion before a scientific society.

It is important that this scientific freedom should not only be allowed as a privilege but insisted upon as a condition. The association of representatives of the Royal Society in the Committee is a guarantee of that freedom, and for that reason is indispensable.

The organisation of scientific criticism implies the association of the trained staff in scientific investigation on terms which are quite different from the ordinary discipline of a government office. This form of organisation has been little regarded during the war, but will be found to be vital in a permanent establishment.

The freedom of scientific investigation involves the maintenance of observatories for the purpose of investigation without any utilitarian purpose. The advantage of this freedom may be inferred from the example of the investigation of the upper air begun in 1905 for its scientific interests only, and yet now extraordinarily useful to aeroplane constructors, artillery officers, and many others.

The Scientific Staff.

It is acknowledged that the Meteorological Office with its present resources cannot supply all the needs of the Air Council, and its resources, particularly in trained scientific staff, would need to be largely increased.

The limitation of the activities of the Office to what can be accomplished with so small a grant in aid as £22,500 is accounted for, not by any limitation of the ultimate scope and importance of meteorological work in the world, but the position of modern meteorological science. It is the creation of little more than a century, although weather prophecy goes back to the dawn of history. Its certain progress depends mainly upon a slow methodical statistical process and the gradual accumulation of pertinent facts. There have been some notable contributions by men of genius; men with scientific training professionally employed have been very few, but upon them depends the systematic development of the subject. The first step in the enlargement of meteorological activity should be the increase of the trained scientific staff. That is the only guarantee for real progress.

What we have therefore to provide for is an adequate supply of properly trained men to undertake the responsible duties of meteorologists at the Office, its Observatories and wherever else in the country and the empire the services of such men may be required. With a proper organization, men qualified should pass from one duty to another at the Office or an Observatory or an information depot. All should be included in a single profession graded so as to attract and provide for sufficient men of the highest scientific standing.

At present there is a scientific staff of about 20 men attached directly to the Meteorological Office, and of about 120 belonging to the Meteorological Section R.E., which is in process of being considerably increased and which is employed in various sections of the fronts and at four establishments at home for artillery, including sound-ranging, gas, as well as air-services and for general purposes. Besides these there are about 44 officers and 149 trained ratings belonging to the Naval Meteorological Service, now employed at Naval Air Stations, and the Air Ministry may require an establishment which will run to say 75 to 100 officers.

The Meteorological Committee have presented to the Minister of Reconstruction a memorandum recommending that the scientific staff of the Office and its Observatories should be increased to 40 or 50. Many other officers are at present in temporary appointments, but as a permanent provision all require to be co-ordinated into a unified professional service that offers proper opportunities of experience and promotion.

The supply of Instruments and Information.

The other side of the activity of the Office is much more analogous to the work of government departments, and it can be organised in consultation with the technical officers of the various departments in the usual manner.

The proposal of the Ministry of Air and the Alternative.

The absorption of the Meteorological Office by the Air Ministry could provide the necessary unity of the professional staff and could arrange for the supply of information in agreed forms. It would be necessary to continue the present Committee of control representing the Royal Society and the various departments interested. But the Committee would be an advisory committee to the Air Minister instead of being a committee of reference for the Director; and presumably financial

proposals would be subject to the approval of the financial officers of the Board. So that the freedom of scientific research in any direction except that which was obviously for the air would be conditional upon the views of the Minister for the time being and his advisers.

It would also be necessary to organise conferences of technical experts in Artillery, Flying, Engineering, Marine work and so forth to settle many details of work to be done and the form of the information to be supplied.

If it be thought that this arrangement does not give the necessary freedom of scientific initiative or assurance of consideration for other departments, the alternative would appear to be as follows:

(1) A representative of the Air Ministry to join the Meteorological Committee to watch over the interests of the Air Service in the general control of the Meteorological Office.

(2) One or more technical officers of the Air Ministry to join a technical committee consisting of technical officers of the Meteorological Office and the departments interested, for the discussion of technical details.

(3) The expansion of the present organisation of the Office to form a scientific staff belonging to the Meteorological Office, large enough to supply adequately trained men for the requirements of the Air Ministry and any other department requiring trained meteorologists, as the Office has already done successfully with the establishments of the Army included under Meteorological Section R.E.

(4) To place the meteorological establishments of the Air Ministry in charge of meteorologists recommended by the Office for the duty. These officers while in charge would be under the discipline and control of the Air Ministry as the meteorological officers of the R.E. Section are now under Army discipline and control. But they would look to the opportunities of the M.O. staff for promotion.

(5) An arrangement similar to the foregoing to hold good for skilled technical assistants such as now holds with the Meteorological Section R.E.

(6) Regular provision for visitation and inspection from the Central Office. Provision in the case of Meteorological Section R.E. is not fully organised as the demand for officers and information leaves no margin of senior officers available for inspection duty.

Immediate steps.

If this alternative be adopted it would be desirable at once to carry into effect the proposals for reorganisation set out in section 13 of the memorandum on Reconstruction, and on quite other grounds the Committee had decided to ask the Treasury for permission to proceed with part of it forthwith. What would now be required would be to raise the establishment of the professional and technical staff of the Meteorological Office by groups of say ten at a time in order to have men ready to take up work for the Air Ministry as required.

Information required by the Meteorological Office from Air Stations.

It must be recognised that Sir David Henderson is correct in representing that the Air Ministry being in control of Airships, Balloons, Kite Balloons and Aeroplanes has access to an immense amount of information that would be useful to meteorologists. In the case of the Navy, the Mercantile Marine, Agriculture or Fisheries, the Meteorological Committee relies upon the representatives of the department to obtain the information required when asked for by the Director. It must, however, be pointed out that requests of that character have to be put in form and order by establishments under the control of the Office, and information obtained in that way has to be carefully prescribed. So on either scheme there must be opportunities for trials to be made in an experimental manner and they should be made at one of the special meteorological establishments. The facilities of the Office require to be increased in this respect.

An example may explain my meaning, Some months ago we were urged to supply a very large number of barographs, and the Director of experiments of upper air for the Office supplied a working model of the instrument. The next step was its trial under service conditions and the model was sent out to France to be tried, but, although we understood the matter was of extreme urgency no results were obtained for many weeks, whereas an aeroplane on the spot would have done all that was required in two hours. With a properly organised scheme the facilities should be ready at hand in reasonable form for the scientific investigation and that requires separate provision whether the Office be independent or attached.

Summary.

The whole question is a complicated one and I will ask leave to summarise what I have said in an unconventional manner by a financial analogy.

The Meteorological Service is necessarily a kind of joint-stock enterprise for the benefit of all departments of State, Navy, Army, Air Service, Home Service, Colonial Office and the general public, with the understanding that the benefit is really contingent upon scientific investigation.

Science accordingly holds the ordinary stock of the undertaking, while Government holds the debenture stock for the benefit of the various departments and the public. That is the meaning of the vote being a grant in aid for scientific investigation.

It is the business of the direction while maintaining the market value of the debenture stock to make profit on the ordinary stock by and for scientific investigation, which means sharing in a number of international scientific enterprises and supplementing them by spontaneous efforts. The division of obligation and interest is therefore clear-cut and simple.

If the Office is attached to one department of State the arrangement is more confused. The other departments must either have no shares at all or still hold debenture stock, and their interests will be a first charge on the undertaking.

But only their specified interests because the market value of the debenture stock no longer matters.

The department will hold the ordinary stock, and scientific investigation will not be entitled to anything in its own right. But if and when the ordinary stock-holder is a benevolent person he may be successful in finding capital and/or facilities for scientific investigation as well as his own requirements, and it will be to his interest in the long run to do so.

Yours, &c.,
NAPIER SHAW.

P.S.—This letter has been circulated to members of the Committee. The Hydrographer is doubtful whether I have made it sufficiently clear "that the alternative scheme of page 6 is the one that we personally most favour." I gathered that all the representatives of departments were distinctly of that view, but I postponed a formal expression of opinion from the Committee until the alternative had been formulated and considered.

G. L. Barstow, Esq., C.B.,
H.M. Treasury,
Whitehall, S.W. 1.

Treasury.—*Suggested Local Centres for Scotland and Ireland.*—Reported—the following letter :—

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SIR, 14th February, 1918.

CIRCUMSTANCES have arisen which make it desirable for me to ask for Their Lordships' guidance on a question of policy which would involve expenditure beyond what is already provided.

At their last meeting the Meteorological Committee were informed that a proposal for the transfer of the Office to the Air Ministry had been put forward, and I was asked to set out for the information of the members of the Committee nominated by Their Lordships a statement of the alternatives available for the satisfaction of the requirements of the various services and the needs of scientific investigation, as between absorption by one department of State on the one hand and continued direct dependence upon the Treasury with equal obligation to all the executive departments on the other.

In doing so I pointed out that the latter alternative, which was favoured by all the nominated representatives of departments present, involved the obligation to deal promptly and effectively with all the requirements of the various services as they become known.

The Committee had before them a proposal from the Astronomer Royal for Scotland (President of the Scottish Meteorological Society) for the establishment of a Branch Office in Edinburgh for the supply of daily reports and forecasts to meet various local needs which were set out. The establishment of local centres of that kind, of which an example already exists at South Farnborough, has always been regarded as a natural development of the Office system which has become urgent during the war, partly on account of the greater urgency of local needs and partly on account of the unavoidable delays in the postal arrangements. The organisation of such local centres is contemplated as part of the duties of supply, which, according to the scheme put forward in my letter of 25th January, 1918 (*see Minute* 685), would devolve upon the Controller of the Office. The Committee therefore approved of the proposal, subject to the provision of ways and means.

The new circumstances referred to are a communication forwarded through the Naval Meteorological Service from the Admiral Commanding at Queenstown, representing that the Daily Weather Report does not reach him now in the course of post until 48 hours after the epoch to which the report refers, and asking for earlier posting, which is not practicable. On the basis of the Office continuing to make provision for the distribution of necessary information on an independent footing the only course is to establish a local centre in Ireland.

Thus from that point of view the immediate steps are the establishment of such local centres as the Committee have always regarded as desirable ; one in Scotland—presumably in Edinburgh, and the other in Ireland, presumably in Dublin. Of the two the establishment in Ireland is the more immediately urgent because, besides the Admiral at Queenstown, there are other centres that could be reached, and the American Services are understood to require some assistance of the same kind.

A local centre implies :—

(1) A daily telegram of data such as is now despatched to G.H.Q. France and other centres, costing about 10*s.* a day, say £180 a year.

(2) A trained meteorologist stationed at the centre with an assistant in training (engaged locally) to receive the telegrams, prepare a report, and map and organise the distribution of the information, say £300 a year and £150 a year.

(3) Provision for manifolding the reports and maps by lithography or some other process, say £100 a year.

(4) A room for an officer, conveniently situated, for the receipt and despatch of telegrams, together with postages, telegrams, and incidental expenses, say £100 a year.

Local facilities already possessed by Government might possibly provide for the greater part of (3) and (4).

The time of the professional staff would not be fully occupied with the work immediately proposed. The preparation and issue of a report and map would be a morning's work, and it is probable that the demands would increase and the whole time be filled. Pending that, arrangements should be made for them to deal with other work which would relieve the Central Office of some part of the work which now presses heavily upon the staff.

So far as the Office is concerned the main difficulty would be to find a suitable trained meteorologist for the work. As the demand for trained men by the various services and the extension of the forecast duty at the Office have absorbed all the men immediately available, further reorganisation and perhaps reduction of ordinary office work would be necessary to obtain the staff, and it is not desirable to move in that direction without Their Lordships' approval of the principle.

The alternative would be either for the Admiralty to deal with the matter through the Naval Meteorological Service, or the Air Service to take it up as part of their local duty. Either department has less difficulty than the Meteorological Office in getting the men. The expense would in any case be the same; but if the Office is to serve the requirements of the different services equally this is the kind of duty which it must keep in its own control and not hand it over to separate departments.

I am, &c.,
NAPIER SHAW.

The Secretary,
H.M. Treasury,
Whitehall, S.W. 1.

Admiralty.—*Weather Telegrams to Athens.*—Reported—the receipt of a letter M.O. 2,988 of 2nd March, 1918, transmitting copies of communications from the Greek Ministry of Marine and the head of the British Naval Mission at Athens to the British Naval Attaché at that town, asking that meteorological information might be telegraphed daily to the Athens Observatory. The service had been discontinued in 1915 in consequence of the outbreak of war, but forecasts from Athens were now required for Allied officers commanding naval bases in Greek waters.

The Director had replied that no objection to the despatch of the telegrams would be raised by this Office providing the consent of the naval and military authorities was obtained, but that in view of the distance from England occasional reports only were necessary, and in his opinion all the necessary information could be obtained from G.H.Q. Salonika, which already received regular information by telegraph.

Hydrographer.—*Publication of Weather Information.*—Reported—the receipt of an unofficial letter from the Hydrographer drawing attention to the current weather information given in certain newspapers. The Director had replied that the information published was based on a schedule of observations at health resorts issued by the Office according to the arrangement laid down in 1914–15. In deference to the change in public sentiment about the possible use of information about the weather, the Office might agree to the suppression of the issue.

It was agreed that the issue to the Press of the schedule of observations from health resorts should be suspended on receipt of an official request from the Admiralty or Home Defence.

685. OFFICE STAFF.—**Office Organisation.**—Reported—that, in accordance with the provisions of Minute 675, the following communication had been sent to the Treasury :—

SIR, 25th January, 1918.

IN view of the development of the Meteorological Section R.E. in order to meet the requirements of the armies in the field, the artillery and the special companies at home, and to enable the Meteorological Service to meet the additional requirements of the Air Ministry, the Meteorological Committee find it necessary to ask the assistance of Their Lordships.

The position is set out in the Memorandum of which a copy is enclosed herewith. [Printed in Minute 675.] It was approved by the Meteorological Committee on Wednesday, 23rd January.

What is asked for is the approval of the appointment of Major Lyons as *Controller of the Meteorological Office* with the duties defined in the Memorandum. The title of Controller is selected because it represents the organisation and administration under the general direction of the Director of that part of the work of the Office which deals with the supplies of various kinds, instruments, material, forms, publications, and other information to departments of Government and the general public, all of which together represent the direct utilitarian output of the Office, the application to practical purposes of the material collected by the Office. This duty belongs especially to the central Office.

The Director would retain the general direction of all the Office establishments with the financial responsibility of the accounting officer and the other duties set out in the Memorandum, which include the supervision of the Observatories and all those duties which are concerned with the accumulation of the body of material which the Controller would have at his disposal, and with the use of the material for the advancement of the sciences, the replies to inquiries involving special investigations, and the preparation of books or other compilations which are indirectly of practical importance, though they are not in the form of answers to questions put by inquirers.

It is this division of duties which is represented by the titles of Director-General and Controller. The Committee thought that, in present circumstances, the salary to be provided for the Controller of the Office might be £800 per annum. The Committee realise that when the whole scheme comes up for consideration, and the future is considered, it will be necessary to propose an adjustment of the

titles and salaries of the senior officers of the various establishments and divisions more in accordance with their responsibilities. The present standards represent tentative efforts, in an experimental period. Having proved themselves to be successful they deserve reconsideration. The Committee are willing to take the whole matter in hand if Their Lordships think the occasion more favourable than some future time.

For some years now Major Lyons has been in charge of the Meteorological Section R.E. which began in May 1915 by the appointment upon my recommendation of four meteorologists, two to be in France and two at home as reserve, to advise the R.F.C. in weather questions, commissioned in the general list of infantry, two as captains and two as subalterns, in order to bring them under military control. It is now a unit of the R.E. with an authorised establishment of 150 officers and men in France, Salonika, Italy, and at four centres in England. In France a major is in command with a number of captains and subalterns under him; for detachments in Italy, Salonika, and in this country four captains. The charge of this unit at home includes not only complying with Army regulations, but finding men with suitable qualifications, arranging new establishments, providing outfit, &c., and occasional visits of inspection to the establishments at G.H.Q. and in this country.

The duty requires in fact scientific and administrative qualities of an exceptional order, and the difference between the duty of Commandant in France and the general administrative charge of the unit is really much more than the mere difference of seniority of two majors of Engineers. Major Lyons' quite uncommon organising capacity, well known to all who knew of his work as Director-General of the Egyptian Survey Department, is invaluable in this connexion. The Committee therefore ask that Major Lyons should be advanced in rank so as to mark him out as the Officer in charge of the whole unit, and they trust that Their Lordships will see their way to move the War Office in the matter.

The question as to the mode of making up the salary remains. The Committee would be prepared (if Their Lordships think fit) to make the appointment as a civil appointment of £800 a year and deduct the Army pay. But they recognise that many technical questions are involved of which the Committee have little experience, and they ask for Their Lordships' guidance in the matter.

I am, &c.,
NAPIER SHAW.

The Secretary,
H.M. Treasury,
Whitehall, S.W. 1.

After discussion it was agreed that the best solution for the time being was for Sir Napier Shaw to become Scientific Adviser to the Government on Meteorology, and to retain the Chairmanship of the Committee in that capacity; while Major Lyons should act as Director during the continuance of the war, retaining his seat on the Committee as representative of the Royal Society. Mr. Barstow was requested to submit the proposal for the approval of the Treasury in place of that outlined in the Director's memorandum of Minute 675.

War Bonus.—*Position of Staff at Observatories.*—Recommended—that in view of the special local circumstances the following rates of war bonus be allowed:—

Eskdale Observatory	J. Burns	7*s.* a week.	
	J. Stoddart	10*s.*	,,
	Miss M. Anderson ...	1*s.*	,,
	Miss M. A. Kerr ...	1*s.*	,,
Valencia Observatory	M. Sugrue	7*s.*	,,
	M. J. Morley ...	5*s.*	,,
	J. B. Morley ...	5*s.*	,,
	J. Sullivan	7*s.*	,,
Falmouth Observatory	J. B. Phillips ...	7*s.*	,,

Office.—Mr. Harries, having passed the age of superannuation and being retained on duty, but not with the full attendances of a forecaster taking turn of night duty, war bonus to bring his salary up to £369·12*s.* year;

and in all other cases where provision for war bonus has not otherwise been made, the allowances set out in Minute 675 be approved.

Approved.

Drawing Office.—*Proposed Establishment.*—Reported—that on the resignation of Miss E. V. Turney, Photographic Assistant, it was proposed to form a drawing office, in charge of a principal assistant, in which drawing would be done for all the divisions of the Office. Room 28 on the top floor was suggested as being suitable for the purpose. The staff would be principally drawn as far as possible from the draughtsmen already in the Office.

Salary List 1918-19.—Reported—that Mr. J. Sheerman and Mr. R. F. Wallace had attained the age of superannuation, but had been retained for the time being under Minute 591.

Submitted—the following recommendations :—

Promotions incidental to the Retirements on Superannuation :—

B. G. Brame to be Clerk Assistant from Clerk Computer.

Probationers and Girl Clerks :—

Miss M. B. Bigelstone to be Clerk Assistant from Probationer.
Miss W. Bulgin to be Clerk Computer from Girl Clerk.

Forecast Division.—*Mr. R. G. K. Lempfert.*—Read—letter from Mr. Lempfert requesting an increase of salary in view of the greatly increased responsibilities of his position. It was agreed that the salary be fixed for the ensuing year at £600.

Mr. H. L. B. Tarrant.—Read also—a recommendation from Mr. Lempfert that Mr. H. L. B. Tarrant, who had received no increase of salary on his transfer to the Forecast Division, should receive a special allowance of £4 4*s.* a month in consideration of the irregular hours worked.

Approved.

New Appointments.—Reported—the following Director's Orders for confirmation :—

Order 663 appointing *Mr. Hassan Fahmy* temporary assistant in the Statistical Division at a salary of £2 10*s.* per week. The appointment is to date from 4th February, 1918, and to be terminable by a week's notice on either side.

Order 664 appointing *Miss Theresa M. Hunt* temporary clerk in the Statistical Division at a salary of 19*s.* per week, with a war bonus of 6*s.* a week. The appointment to date from 11th February, 1918, and to be subject to a week's notice on either side.

Order appointing *Mr. R. E. Watson* Senior Professional Assistant, for duty in the first place at Kew, at a commencing salary of £225 and a war bonus of £34 per annum, on the terms of Circular 002 and endowment assurance in accordance with Minute 623. The appointment to date from 25th March, 1918.

Order 673 appointing *Miss Dorothy J. Taylor* Clerk Assistant in the Instruments Division on the terms of Circular 002, with a war bonus of 9*s.* a week. The appointment to date from 2nd April, 1918.

Order 674 appointing *Miss Emily R. Andrews* Girl Clerk on the terms of Circular 002, with a war bonus of 7*s.* a week. Miss Andrews will take duty in the first place in the Central Registry, with a view to her transfer to the Drawing Office on its establishment. The appointment to date from 2nd April, 1918.

Approved.

Holiday Assistant.—*Mr. Norman Tunstall.*—Reported—that Mr. N. Tunstall had again offered his services for duty during the Holidays, and had been accepted for duty for four weeks from 26th March at South Farnborough and for 2 months, July and August, in the summer, the exact dates to be fixed later. Remuneration to be at the rate of £225 per annum with quarters, or £275 without quarters.

Approved.

686. Observatories.—**Richmond.**—*Grazing Land.*—Reported—that the land in the enclosure at Kew Observatory, rented by the Office from the Office of Woods and Forests and sub-let to the Mid-Surrey Golf Club for pasturing their horses, was not now put to that use, and that, on being consulted, Mr. Middleton had suggested that the land might be profitably rented to cow-keepers for grazing cattle. This suggestion was put forward to the Golf Club, who had replied that the grass in the enclosure was not fit for grazing, and that the inaccessibility of the site would make it difficult to let to a cow-keeper. Finally the Club offered to surrender the tenancy.

It was agreed not to disturb the tenancy.

Land to be Cultivated as Allotments.—Reported—an application from members of the staff of Kew Observatory for permission to cultivate as allotments a portion of the Observatory land now used for lawn. Permission had been given for Mr. Boxall and Mr. Francis to cultivate 10 rods each, and L. E. Fletcher and A. C. Lloyd to cultivate 10 rods between them. The tenure would be until 31st December, 1918, and could be

continued thereafter if the respective holders remained members of the staff and desired to continue. Should they have ceased to be members of the staff the approval of the Office to their continuing their tenure would be necessary.

Approved.

Eskdale.—*Resignation of Mechanic and Housekeeper.*—Reported—the resignation of John Burns and Mrs. Burns, mechanic and housekeeper at Eskdale Observatory, to take effect from 2nd May, 1918.

It was reported that Dr. Mitchell had been asked to take steps to fill the vacancies.

Girl Clerks.—Reported—that Miss M. A. Kerr had signified her intention to leave at the end of July next, but that Miss M. Anderson wished to remain if she were granted an increase of salary.

It was agreed to increase Miss Anderson's salary to £85 a year, and to request Dr. Mitchell to fill the vacancy.

South Farnborough.—*Inquiry into the Detection of Approaching Thunderstorms.*—The Director submitted the following memorandum together with a plan of the proposed site for a station at Pyestock and the plane and elevation of the proposed wooden tower at Eskdalemuir.

THE BRANCH OFFICE AT SOUTH FARNBOROUGH AND THE INQUIRY INTO THE LOCATING OF THUNDERSTORMS BY RADIOTELEGRAPHY.

The Original Arrangement.

The arrangement for the establishment of a branch office at South Farnborough was made in 1911 at the request of the War Office. The War Office undertook to provide accommodation for :

i. An office ;

ii. A properly equipped auxiliary observatory for the study of the upper air ;

iii. A workshop or laboratory ;

and in addition a certain amount of furniture, tools, equipment, and assistance. The Office was to provide the professional staff and the general direction. The accommodation was to be provided in the new buildings in connexion with the enlargement of the Balloon Factory which was then projected and was expected to be ready by April, 1912.

The functions of the branch office are set out in Minute 284 of the Advisory Committee for Aeronautics as follows :—

i. To supply meteorological information and forecasts in a form directly applicable for the guidance of airmen ;

ii. To carry on the experimental work hitherto conducted by Mr. J. S. Dines for the Advisory Committee at Pyrton Hill ;

iii. To act as an observing station for the Meteorological Office.

Details as to these functions are set out in the Minute. The use of the branch office as an observing station for the Office for the work of the Daily Weather Service and the study of the upper air was taken as the consideration for the responsibility for the staff and administration.

The professional staff was to include a meteorologist in charge and a trained assistant.

The Experimental Work.

Mr. J. S. Dines had been in charge of experimental work for the Advisory Committee under the Director of the Meteorological Office from April, 1910. The work was done at Mr. W. H. Dines' Observatory at Pyrton Hill, the central establishment of the Meteorological Office for the study of the upper air. Four reports on wind structure, published in the technical Reports of the Advisory Committee, represent this part of the work up to March, 1913. The subsequent reports are not published.

The Branch Office.

When the Branch Office was projected Mr. J. S. Dines was selected as Meteorologist in charge. A long delay took place in the provision of the accommodation. Mr. Dines was sent to Farnborough in the autumn of 1912 to make a provisional investigation with apparatus newly designed for pilot ballooning. The accommodation was not available until December, 1913, when Mr. Dines moved there ; he was joined on 1st January, 1914, by Mr. Billett, who had been selected as assistant and had been in training at the Central Office from 1st July, 1913. The work of the Branch Office was not in full operation until March, 1914 ; the equipment was still incomplete. Meanwhile an establishment with a similar purpose had been set up at Upavon for the Central Flying School, the Meteorologist in charge there being Mr. G. Dobson, who was taken from the Meteorological Office, but was transferred to the War Office. For that establishment the Meteorological Office acted only in an advisory capacity, but the two establishments at South Farnborough and Upavon worked in co-operation arranged by the Meteorologists in charge.

Many changes in the arrangements of the aircraft services had taken place when the work of the Branch Office began. The Balloon Factory had become the Royal Aircraft Factory, and the airships for which ordinary meteorological information was of special importance had been removed from South Farnborough. The pilots of aeroplanes required information of a somewhat different character, so that the enterprise had to feel its way and adjust itself to new conditions. It had not been in operation more than five months when war broke out.

War Conditions. Early Morning Reports.

At the outbreak of war a good deal of the aircraft activity for which meteorological information was required was transferred from South Farnborough. The meteorological work at Upavon was abandoned altogether, but the Office at South Farnborough was maintained in operation awaiting events. On 13th August, 1914, a demand for information and forecasts at 4 a.m. came from airship authorities at Dover, and a service of telegraphic reports at 3 a.m. was organised in order to meet the demand. The information was supplied to other airship centres and found acceptable. It has continued ever since and has now become a regular service of reports at 1 a.m. at the Meteorological Office. At first the work was done at the Branch Office, as that was the office intended for aircraft work ; but the collection of telegraphic reports there was not convenient, so the work was transferred to South Kensington, and the Meteorologist in charge at South Farnborough, while keeping his ordinary work going, took part of the night duty at the Central Office.

Changes since 1914.

In February, 1915, Mr. Billett, the assistant at South Farnborough, left to take up an appointment in South Africa. Subsequently he joined the Army and lost his life in France. His place at the Branch Office was taken by A. H. R. Goldie, who is now in charge of a detachment of the Meteorological Section R.E., and at the same time Mr. C. J. P. Cave, of Ditcham Park, who volunteered for duty, was appointed Special Inspector of the Branch Office to act as liaison officer between the Office and the services, to carry on some of the work of the Office, and to give lectures to the junior officers of the R.F.C. in training at South Farnborough, subsequently also at Oxford. Mr. Cave brought with him from his private observatory a thunderstorm-recorder of the Hoser type and commenced the thunderstorm inquiry at South Farnborough, with the help of Dr. Widdington, who was then at the R.A.F. The inquiry was subsequently financed as an experimental investigation by the Advisory Committee for Aeronautics.

In May, 1915, meteorological work at Headquarters in France in connexion with the Office was arranged for the R.F.C. and then for the Special Companies R.E. Mr. Cave and Mr. Goldie were selected as reserve officers in England. Captain Cave continued to act as Special Inspector of the Branch Office and to conduct the thunderstorm inquiry when not required in France. The work there has developed very largely, and a regular staff of officers has been organised under Major Gold as Commandant.

Mr. Goldie left South Farnborough for Eskdalemuir in April, but in June was nominated for a commission. His place was taken by Mr. C. D. Stewart, who also passed into the Meteorological Section R.E., as did also his successor Mr. F. Entwistle, who left South Farnborough for France on 17th August.

In September, Dr. Widdington having left Farnborough, Mr. R. A. W. Watt, of University College, Dundee, with an expert knowledge of wireless telegraphy, was appointed assistant for the thunderstorm inquiry.

Mr. E. L. Hawke joined as voluntary assistant in April, but was transferred to South Kensington in August.

In October, 1915, Mr. J. S. Dines was also transferred to South Kensington, as the work in forecasting required additional staff, and Captain Cave became Meteorologist in charge at South Farnborough, with Mr. Watt as Assistant.

In February, 1916, Captain Cave arranged with the Admiralty through Commander Slee for the Admiralty wireless stations to co-operate in the thunderstorm inquiry, and they commenced sending daily reports on 1st April.

In June, 1917, Captain Cave moved to London in order to bring the organisation of the thunderstorm inquiry into relation with the regular work of the Forecast Division. He still remained in charge of the inquiry and the inspection of the Branch Office, but Mr. Watt became Meteorologist in charge at South Farnborough. By that time the supply of trained physicists had become exhausted, and Mr. Watt had the assistance only of a corporal mechanic until December, when Mr. Hawke was sent.

Captain Cave's health unfortunately gave way in the autumn of 1917, and he was advised not to return to work at the Office. After being in hospital for six weeks he was placed in charge of a new establishment on Salisbury Plain and of an enlarged reserve in England of the Meteorological Section R.E.

The Present Situation.

In the report of a recent visit of inspection Captain Cave speaks very highly of Mr. Watt's ability and activity, and there is no doubt about his competence in respect of radio-telegraphy, but additional assistance is needed to provide time for the prosecution of the special inquiry. The Branch Office begins work at 7 a.m. with ordinary observations, wireless observations, and a pilot balloon ascent, and ends at 9 p.m. with the receipt of the 18h. report from the Meteorological Office and any necessary action upon it. Besides conducting its observational work it sends reports or forecasts, or both, to various branches of the R.A.F., to the officer commanding R.F.C., to the Aeronautical Inspection Department, to the R.E. Lands, to the Aldershot Command Medical School, to the Meteorological Office, to G.H.Q. in France, and (every two hours) to Hendon Aerodrome.

He adds that officers engaged in experimental work at the R.A.F. and other officials in the Factory find the meteorological work extremely valuable. No information is sent to the Aldershot Command except a time signal at 9.55.

The pilot balloon observations compare favourably with those of any other station which reports to the Meteorological Office. These, with some work in tabulation (which is done at South Farnborough so that the staff may keep themselves in touch with what goes on elsewhere) and the thunderstorm inquiry, constitute the return which the Branch Office makes for its maintenance. The rest of the work belongs entirely to the distributive side of office work.

Mr. Watt now reports that the Royal Aircraft Factory desires to absorb a considerable part of the accommodation which the Office occupies. He also points out that the exposure of the outdoor instruments is quite unsatisfactory. As a matter of fact it always has been ; the arrangements agreed upon for the accommodation of these instruments have always been disregarded on the ground of the convenience of the Factory or airmen, or of the disfiguring appearance of a proper station. The anemometer belonging to the Office is at Pyestock Chimney, four miles away. There is now no special reason why the Branch Office should be attached to the Aircraft Factory and some cogent reasons why it should not.

If the Aircraft Factory desires the space the separation of the two should be preferred. If the War Office desires a Branch Office still to be maintained within the region of the Aldershot Command a suitable site should be selected outside the Factory, retaining only a single room there for a "liaison" officer, where one of the professional staff could attend as may be required, and where a small library of meteorological information, books, charts, and tables could be stored.

Mr. Watt suggests the Pyestock Chimney as the best locality, and would like the whole of the work consolidated there. It would require his own residential hut to be removed and suitable arrangements for water, light, and telephones, and a service motor to be available. There is no reason why the Meteorological Committee should undertake these expenses. It could more easily move the part of the work in which it is interested to another of its establishments. But if the War Office wishes the work maintained, and will provide the site, the Meteorological Office should assent.

The Thunderstorm Inquiry.

The purpose of the inquiry is to identify and determine the locality of lightning flashes by directional wireless. For this purpose the atmospherics are used, but special tuning is necessary and the apparatus must be continuously available. With the directional apparatus is associated the automatic recording of lightning, for which at present a coherer is used, but is found to vary so greatly in sensitiveness that it is not quite satisfactory. Still, continuous records have been maintained for a long time now. Thunderstorms have been satisfactorily located on many occasions, and sometimes their progress has been traced at great distances, as from the Bay of Biscay across France.

There is no doubt that the method could be used quite effectively for tracing the progress of distant thunderstorms, but to work the method three stations are required, and at present there is only one.

Efforts are being made by Captain Cave to use reports of atmospherics telegraphed from the Admiralty wireless stations, but the operators work on a different wave length, and are otherwise engaged for so large a part of their time that they cannot co-operate effectively. In dealing with thunderstorms, observations must be arranged to suit the occurrence of the phenomena. It has therefore been proposed to set up two other stations in addition to South Farnborough. Eskdalemuir and Cahirciveen were selected. The Meteorological Committee have sanctioned the erection of the apparatus at a cost of about £500, and much of the wireless apparatus has already been constructed by Mr. Watt at the Branch Office.

The wireless installation of the Branch Office is at Smallshot Bottom, Aldershot. The Office, by permission of the C.R.E., Aldershot, has the use of a wireless mast and a hut belonging to the War Office. The Office possesses a portable residential hut placed on W.O. land as official quarters for the Meteorologist in charge.

The site is threatened, according to Mr. Watt, by a scheme for the laying-out of a recreation ground. He would like a station set up with the rest of the meteorological work near Pyestock Chimney which would be available as a wireless mast.

As regards the other stations proposed, a suitable site at Eskdalemuir could be obtained on land belonging to the Duke of Buccleugh, just outside the Observatory enclosure. Dr. Creighton Mitchell, Superintendent, wants a tower for the Observatory for special meteorological work on the lowest 100 feet of air. He has therefore substituted for the original proposal of a rigged mast, estimated to cost £100, a design for a wooden tower, with a ladder up to 100 feet, prepared by H.M. Office of Works, Edinburgh, and estimated to cost from £500 to £600.

As to Cahirciveen, it has been ascertained from the Admiralty that a receiving wireless there would be practically useless for the purpose in view on account of the Admiralty Wireless Station on Valencia Island, not far off. Another site in Ireland would have to be selected. Armagh is the only one that suggests itself among the localities where the Office has interests, but a position further south would be better. The South East of Ireland forms a notable gap in the network of Office stations, and perhaps a site may be formed there.

The cost of the equipment would be considerable, probably reaching £1,000, if the wooden tower at Eskdalemuir is included.

But a real difficulty lies in the provision of trained assistants. All the men with the necessary preliminary training have passed into the Army either through the Meteorological Section R.E. or otherwise. There is no professional assistant now at Richmond (Kew), Eskdalemuir, Cahirciveen (Valencia), Benson, or Falmouth. An additional one would be required at Farnborough. The Branch Office works for the War Office, but it is a civil establishment. The work of the thunderstorm inquiry cannot be carried on without three additional professional assistants.

At the same time the inquiry has reached the stage when practical success is assured if the work is taken seriously in hand. The tracking of thunderstorms over the country would be undoubtedly one of the utmost value to the air services and is within reach. If the Meteorological Office leaves it undone, some other body will certainly be called upon to do it, and will probably go over the work that has been done.

Conclusion.

The following questions require decision :—

1. Whether the War Office desires the continuance of a Branch Office in the Aldershot District; and if so, will they provide a site and other necessary facilities near Pyestock Chimney? If the answer to this is in the affirmative, arrangements could be made with the Aircraft Factory for a liaison room.
2. If that is decided in the negative, whether the experimental work of the present Branch Office should be removed to Benson, where general training in methods of the study of the upper air can be obtained.
3. Whether the thunderstorm investigation should go forward.
4. Whether the proposal for a wooden tower instead of a mast at Eskdalemuir at a cost of from £500 to £600 should be approved.
5. Whether a site for the third thunderstorm station should be sought at Armagh or in the South East of Ireland.
6. What steps should be taken to secure professional assistants with the necessary preliminary training?

NOTE.—At the beginning of 1915 a Memorandum was drawn up for the organisation of meteorological work in connexion with aeronautics which is printed in Minute 628 of the Advisory Committee. It includes provision at South Farnborough for a Professor of Meteorology, a Meteorologist and a Flight Assistant, and clerical and technical assistance and also the service of an aeroplane for the Flight Assistant. The proposal was approved by the War Office, and Mr. G. I. Taylor was appointed Professor of Meteorology. The rest of the scheme was dependent upon the provision of an aeroplane, which in the circumstances could not be pressed. The Professor of Meteorology, as an officer of the R.F.C., has drifted away from South Farnborough, but his mechanical assistant remains there.

NAPIER SHAW.

Meteorological Office,
6th March, 1918.

The consideration of the questions was postponed.

Edinburgh.—*Application for Increased Grant.*—Reported—the receipt of letter (M.O. 1914) of 9th February, 1918, asking for an increase in the grant of £350 a year made by the Meteorological Committee, as owing to war conditions the finances of the Society were insufficient to pay the staff adequate salaries.

It was agreed to increase the grant by £15 a quarter.

687. STATIONS.—**Bidston Observatory.**—*Acceptance of offer of Payment as proposed.*—Reported—the receipt of letter (M.O. 1770) of 5th February, 1918, from the Mersey Docks and Harbour Board accepting the payment proposed in Minute 678, the money to be distributed as the Board may decide.

Approved.

688. SUPPLY OF INSTRUMENTS TO ADMIRALTY.—Major Lyons reported as follows :—

"All arrangements have been made to commence the new method of accounting on 1st April, 1918, and the value of the Admiralty instruments in stock on 19th March was

	£	s.	d.
New instruments	636	19	0
Part-worn instruments	539	3	9
	£1,176	2	9

Mr. Corless deserves the greatest credit and also his staff for their work in connexion with the supply of instruments."

689. ADVISORY COMMITTEE ON ATMOSPHERIC POLLUTION.—*Application for a further Grant of* £500.—Read—the following letter :—

SIR, 11th March, 1918.

ON behalf of the Meteorological Committee I beg leave to forward an application for a grant of £500 for the ensuing financial year drawn up by the Advisory Committee on Atmospheric Pollution.

The proposed grant of £500 is intended to be in addition to the balance of the grant for 1917–18. The balance is estimated to be £72.

With regard to the enquiry by means of the "Standard Gauge" which occupied the main part of the attention of the Committee up to 1917, I am able to report that the number of gauges in operation at present is 25, the same as in January, 1917. Three new stations are to begin work on 1st April, 1918—two at Southport and one at the Experimental station of the Lawes Agricultural Trust at Rothamsted.

In the course of the year the question of the determination of the amonnt of impurity suspended in the atmosphere was brought to the notice of the Advisory Committee. The Committee had already considered and tried a number of methods of making the determinations and placed further consideration of the questions in the hands of an expert sub-committee. Various trials of apparatus have been made with promising results. The Committee propose therefore, in the ensuing year to prosecute that side of the inquiry in addition to the work with the standard gauge.

The research requires the services of an assistant who can devote himself to details and also some considerable expenditure on trial instruments and their maintenance. £150 is asked for under the first head and £115 under the second. It is proposed to continue the £100 honorarium to the Secretary. Of the remaining £207, £113 is required for the publication of the report on the same lines as heretofore and the rest for Office and Incidental Expenses.

I am, &c.,
NAPIER SHAW.

The Secretary,
Research Department,
15, Great George St.,
Westminster, S.W.

Approved.

690. PUBLICATIONS.—**Daily Weather Report.**—Submitted—a new draft with alterations proposed by the Superintendent.

The matter was referred to the Director for action.

Professional Notes.—Reported—that a new series of short papers by members of the staff, under the title of Professional Notes, had been inaugurated. No. 1. "On the diurnal variation of Cloud" by Lieutenant D. Brunt had been sent to the press, and proofs were laid on the table.

Meteorological Vocabulary.—Reported—that in view of the desirability of agreeing to conventional meetings for certain words and phrases commonly used in meteorological reports, it had become advisable to issue a Meteorological Vocabulary for the use both of the forecasters and the users of the Reports. Proofs of the Vocabulary were submitted to the Committee. They are under the consideration of a conference of the authorities concerned.

Memorandum on Visibility.—Submitted—a memorandum on Visibility prepared by the Director at the request of the Hydrographer. The memorandum referred particularly to observations at sea. It had been printed by the Royal Naval Air Service, who would supply the Office with the number of copies required.

Weather of the British Coasts.—Submitted—a paged revise of this publication, together with proofs of some of the illustrations.

691. DIRECTOR'S REPORT AND ACCOUNTS.—**Reports.**—*Conference on the Publication of Results of Data for Magnetic Declination.*—Submitted—the following Report by the Director :—

NOTES OF A CONFERENCE AT THE METEOROLOGICAL OFFICE ON FRIDAY, 22ND FEBRUARY, 1918, TO CONSIDER THE INFORMATION AS TO MAGNETIC DECLINATION TO BE SUPPLIED PERIODICALLY FOR PUBLICATION IN THE MINING JOURNALS.

Present : The Director of the Meteorological Office.
Major H. G. Lyons, R.E., F.R.S., Chairman of the Gassiot Committee of the Royal Society.
Dr. C. Chree, F.R.S., Superintendent of the Central Observatory of the Meteorological Office at Richmond (Kew Observatory).
Professor Henry Louis, Armstrong College, Newcastle-on-Tyne.
Professor L. T. O'Shea, the University of Sheffield.
Mr. George Spencer, The Mapperly Collieries, near Derby.

1. *Periodical Supply of Information* :—

It was agreed—

(*a*) That the information should be supplied weekly.

(*b*) That the work should run from Sunday to Saturday.

(*c*) That, in the first instance, information as to the declination at Richmond (Surrey) should be given in the form of a table of 12 columns giving the mean declination for each two

hours from 0 hours to 24 hours each day of the week with a 13th column of means for the day and means for the week. Later on it might be found desirable to include also the information for Eskdalemuir or Stonyhurst as representing different latitudes.

(*d*) That the "magnetic character" of each day should be given with a note of explanation of the meaning attached to magnetic character."

(*e*) The mean of the corresponding week of last year should be added to the table (provisionally it would be more convenient to the Observatory to give the mean for the month) and the mean diurnal variation for the same month of the previous year and the previous month of the current year.

(*f*) The figures for any two-hour interval will be marked with an * if during the interval a disturbance ranging over more than 20′ is shown on the autographic record in operation within the two-hour period.

(*g*) Copies of a table of the week's information in accordance with (*a*) to (*f*) are to be prepared as the samples on form 422 submitted to the meeting and circulated to those present at the Conference.

(*h*) When the form has been approved, copies of the information week by week are to be forwarded to

"The Colliery Guardian."
"The Iron and Coal Trades Review."
The Institution of Mining Engineers.

and if application is addressed to the Office by those concerned, also to

"The Mining Journal."
"The Mining World."

(*i*) It is understood that the Institution of Mining Engineers will publish a summary each month of the information which ranges over the month in such form as they may find most convenient when they have the weekly information before them.

Other Matters Brought Forward by Mr. Spenser:—

(*a*) *Surveying by magnetic declination.*—It was suggested that a paper on Terrestrial Magnetism and its importance in Surveying would be an acceptable contribution to the Meeting of the Institution of Mining Engineers in London on June 13th or 14th of this year, Dr. Chree expressed his willingness to prepare a paper for that purpose.

(*b*) *The practical setting out of azimuth marks.*—It was understood that the necessity for accurate azimuth marks was common to observatory work in magnetism and surveys based on magnetic declination, but the Office has no special facilities for providing a surveyor to set out accurate reference marks. In so far as it belonged to the public service at all, the Ordnance Survey was the responsible authority.

(*c*) *Suitable instruments for accurate work in declination.*—Dr. Chree informed the conference that a number of instruments designed for this purpose by the Carnegie Institution of Washington has been made by J. Dover, 574, Woolwich Road, New Charlton, S.E., and had been tested at the Observatory. By arrangement with Mr. Dover instruments of this pattern could be supplied.

(*f*) *Standard needles for compass work.*—Some conversation took place as to the best form of needle for compass work. Mr. Spencer favoured a pattern with wings at the tips carrying a fiducial mark, provided that the magnetic axis could be certified as passing through the geometric centre. The Conference expressed no collective opinion. The experience of the National Physical Laboratory should be available for a solution of this question.

NAPIER SHAW.

22nd February, 1918.

Approved.

Printing of Maps for Meteorological Section R.E. by War Office.—Reported—that with a view to lessening the pressure of work at the M.O. Press, Major Lyons had arranged that the Geographical Section, War Office, should in future print all the maps required by the Meteorological Section R.E.

Destruction of Old Accounts returned from Audit Office.—Reported—that in consideration of the lack of available space for storage in the Office and the Stationery Office request that all papers not required may be pulped, it was proposed to send for pulping all old Receipt and Payment Vouchers relating to the period up to and including 31st March, 1911.

Approved.

War Savings Association.—Reported—the formation of a War Savings Association by members of the Office staff. Fifty-seven members had enrolled, with a total of 193 weekly subscriptions for certificates.

Accounts.—Submitted—the following statement of the Bank Account in the Cash Book :—

	£	s.	d.
Balance on 22nd January, 1918	3,910	16	8
Receipts from 23rd January to 19th March, 1918	2,902	16	10
	6,813	13	6
Cheques drawn from 23rd January to 19th March, 1918	6,561	8	10
Balance on 19th March, 1918	£252	4	8

EIGHTY-FOURTH MEETING.

South Kensington, S.W. 7, 22nd May, 1918.

PRESENT :

THE DIRECTOR, IN THE CHAIR.

MR. BARSTOW. | THE HYDROGRAPHER.
CAPTAIN HARVEY. | LIEUT.-COL. LYONS.

DR. SCHUSTER.

692. The Minutes (683 to 691) of the last Meeting (20th March, 1918) were taken as read and confirmed.

693. CORRESPONDENCE.—**Treasury.**—*Office Organisation.*—Read—Treasury letter 18329 (M.O. 7026) in reply to the representation of Minute 685.

18329/18.

Treasury Chambers,
22nd May, 1918.

SIR,

THE Lords Commissioners of His Majesty's Treasury have had before Them your letter of the 25th January last respecting the proposed appointment of Lieut.-Col. H. G. Lyons, F.R.S., as Controller of the Meteorological Office with a civil salary of £800 a year.

My Lords are informed by the Army Council that, in view of the necessity of the Council having authority over Lieutenant-Colonel Lyons and of that officer, in his turn, being endowed with military authority over the Home Meteorological Services, They consider that it is essential that he should occupy a military position and be paid from army funds the rate appropriate to that position, leaving any balance of civil pay for Their Lordships to determine.

The Council, accordingly, have decided to promote him to the rank of Lieutenant-Colonel in the Royal Engineers, to give him the consequential emoluments, and to appoint him Commandant of the Army Meteorological Services (Home Section) with effect from 29th March, 1918.

My Lords understand that as a result of further consideration and discussion by the Meteorological Committee the proposal of the Committee now takes a somewhat different form from that put forward in January last, and that it is now proposed that, in view of the variety and importance of the scientific problems upon which the Meteorological Office is required as a result of war conditions to advise the fighting forces and of the paucity of competent trained meteorologists, Sir Napier Shaw should be relieved of administrative duties in order that he may devote his whole time to the scientific side of the work, and that Lieutenant-Colonel Lyons should become Acting Director for the period of the war. My Lords are disposed to consider in the special circumstances that this proposal forms the more satisfactory solution, and They are accordingly pleased to approve the proposal that Sir N. Shaw shall for the period of the war become Scientific Adviser to His Majesty's Government on Meteorology, retaining his existing emoluments and the Chairmanship of the Meteorological Committee, Lieutenant-Colonel Lyons, with the consent of the War Office, being appointed Acting Director for the same period with emoluments at the rate of £800 per annum, from which his Army pay would be deducted. Lieutenant-Colonel Lyons will be appointed Accounting Officer for the Meteorological Office grant and would continue to represent the interests of the Army Council on the Committee.

I am to take this opportunity of expressing to you Their Lordships' appreciation of the valuable work which you have for so many years performed in the administration of the Office.

I am, &c.,
T. L. HEATH.

The Director,
Meteorological Office.

The Director was instructed to convey the thanks of the Committee to the Treasury for their action and to give effect to the changes as approved.

Treasury.—*Proposed transfer of the Office to the Air-Ministry* (Minute 675–684).—Mr. Barstow reported that the proposal of the Air-Ministry was still under consideration, although the officers nominated by the Ministry to represent it at a conference to consider the question were no longer attached to the Ministry. The ordinary course would be for the question to be considered at a conference called by the Treasury, including representatives of the various departments concerned and of the Royal Society.

Prepayment of the Cost of Instruments.—Reported—that in consequence of the necessity for acquiring stocks of instruments for issue to various Government departments and for making payments to the manufacturers before accounts can be rendered to the departments, the cash provided by the grant-in-aid is now drawn upon as capital for the supply of instruments, and there must be in consequence a deficit at the end of each quarter and also at the second month of the quarter unless the accounts rendered to the departments are promptly paid or provision made for working capital.

The matter had been represented to the Treasury in letter 5227 of 19th April and the Treasury had replied suggesting that the departments should be pressed for prompt payment, or should make advances. The amounts involved were set out in a further letter 5932 of 17th May, which showed that the normal monthly charge on the grant-in-aid was £2,042, the cash in the bank on 17th May was £2,046 11*s.* 1*d.*, providing only for one month's charges on the grant. The departments owed the office £2,960, but the Office owed £4,156 4*s.* 1*d.* to instrument makers and £1,203 3*s.* 1*d.* to other creditors.

It was thus apparent that the prompt payment by the departments would still leave a larger sum owing to the makers than was suitable for the proper conduct of the business.

It was agreed to make a further representation on the subject to the Treasury.

In the same letter 5932 application was made for a quarterly instalment of the charge on the vote of credit, of which the Treasury had notified their sanction up to £7,000 in the year if necessary in Treasury letter 43850/17, Minute 677.

Director Naval Meteorological Service.—*Ascension Island.*—Read—M.O. 6,130 from Captain R. W. Glennie, Director, Naval Meteorological Service, forwarding a communication from the Commandant of H.M. Island Ascension, respecting the arrangements for meteorological observations on the Island, and asking for remarks on the subject.

It was agreed to represent to the Hydrographer the special opportunity that the Island presents for the investigation of the meteorology of the inter-tropical belt and to urge the re-establishment of meteorological observations at Ascension with equipment for modern meteorological work.

Admiralty.—*Publication of Weather Information.* (Minute 684).—Reported—M.O. 6,635 inviting the Office to take part in a conference upon the publication of weather information in newspapers and its transmission to neutral countries. The Director had signified his concurrence.

Reported—Also that as on 6th April attention had again been called to a summary of observations in a morning paper, orders had been given to discontinue the issue to the press of the daily compilation of data for weather, temperature, sun and rain of Health Resorts.

Weather Prediction.—*Mr. W. M. Robertson.*—Reported—Correspondence with Mr. W. M. Robertson, of Cheltenham, about his system of predicting weather by "calculated periods of varying length," concluding with a letter from Mr. Robertson, requesting the return of his manuscript if no action was intended in regard to it.

The return of the MS. was authorised.

694. Annual Report.—Reported—that the copy of the text of the Annual Report after circulation to and approval by members of the Committee, together with the list of members of the office committees and staff and the accounts in the usual form, had been sent to the Stationery Office for printing, but the proofs had not been received in time for the meeting.

It was ordered that the proofs be circulated as soon as they are received.

695. Office Staff.—**Orders for Confirmation.**—Reported—the following Director's Orders for confirmation :—

670.—Wages of **J. C. Woods**, Boy Messenger, increased from 14*s.* to 16*s.* per week, to date from March 4th.

672.—Wages of **G. Merryweather**, Boy Messenger, increased from 14*s.* to 16*s.* per week, to date from March 25th.

673.—Appointing **Miss D. J. Taylor** as Clerk Assistant in the Instruments Division at a salary of £75 a year, with a War Bonus of 9*s.* a week. To date from April 2nd.

674.—Appointing **Miss E. R. Andrews** as Girl Clerk in the Central Registry at a salary of 14*s.* 6*d.* per week, with a War Bonus of 7*s.* per week. To date from April 2nd.

675.—Appointing **Miss M. Bigelstone**, Girl Clerk, as Clerk Assistant in the Statistical Division at a salary of £75 a year, with a War Bonus of 9*s.* per week. To date from April 1st.

676.—Appointing **A. C. D. Miller** as temporary assistant in the Forecast Division at a salary of 34*s.* 6*d.* per week, inclusive of War Bonus. To date from March 25th.

677.—Increasing the wages of **Miss A. W. C. Fitch**, Girl Clerk, from 17*s.* 6*d.* per week to 19*s.* per week. To date from April 15th.

678.—Increasing the wages of **Miss M. L. Taylor**, Girl Clerk, from 16*s.* to 17*s.* 6*d.* per week. To date from April 22nd.

679.—Appointing **Miss E. Cottrill** as Clerk Computer at a salary of £90 per annum, with a War Bonus of 9*s.* per week. To date from April 1st.

680.—Appointing **R. E. Watson**, B.Sc., as Senior Professional Assistant at a salary of £225 per annum, with a War Bonus of £34 per year. To date from March 25th.

681.—Appointing **Miss A. M. Coleman** as Staff Assistant in the Accounts Division at a salary of £175 per annum, with a War Bonus of £34 per year. To date from May 1st.

682.—Appointing **Miss Tucker** as Typist at the Meteorological Office, South Farnborough, at a salary of £2 per week. To date from April 29th. The salary is recoverable from the War Office.

683.—Appointing **Miss G. L. Thorman**, B.Sc., as Professional Assistant in the Forecast Division at a salary of £175 per annum, with a War Bonus of £22 13*s.* 4*d.* per annum. To date from May 20th.

685.—Appointing **Miss M. Robertson** as Probationer in the Forecast Division at a salary of 19*s.* a week, with a War Bonus of 7*s.* a week. To date from May 17th.

686.—Appointing **R. Ruck** as outdoor boy at Richmond, Kew Observatory, at a salary of 16*s.* per week. To date from April 29th.

687.—Appointing **Miss E. V. Freeman** as Probationer in the Forecast Division at a salary of 19*s.* per week, with a War Bonus of 7*s.* a week. To date from May 22nd.

688.—Appointing **Miss G. M. Littlecott** as Probationer in the Forecast Division at a salary of 19*s.* per week, with a War Bonus of 7*s.* a week. To date from May 22nd.

689.—Appointing **Miss E. G. Johnson** as Probationer in the Forecast Division at a salary of 19*s.* per week, with a War Bonus of 7*s.* a week. To date from May 22nd.

690.—Recommending **Miss G. K. Herbert**, Girl Clerk, for appointment as Clerk Computer, on the attainment of her 21st birthday, on June 3rd, 1918.

Approved.

War Bonus.—In consideration of a representation forwarded by the Superintendent of the Division, the payment to Mr. H. Harries of a salary of £375 per annum (inclusive of War Bonus) in the special circumstances of his continued employment on forecast duty was approved in lieu of the inclusive sum of £369 12*s.*, provided by Minute 685, to date from 1st April, 1918.

696. Observatories and Stations.—**Gassiot Committee.**—*Richmond, Cahirciveen and Eskdalemuir.*—Reported—A meeting of the Gassiot Committee on the 14th May, 1918, at which the part of the annual report dealing with the observatories at Richmond, Cahirciveen and Eskdalemuir, and the accounts of the observatories for the year ended 31st March, 1918, were submitted and approved.

In view of the difference of practice between Blue Hill Observatory (Harvard University) and other institutions, in the nomenclature of the C.G.S. units of pressure, which was brought to the notice of the Committee by the Director on a letter from the Chief of the United States Weather Bureau (*see* Minute 701), the Gassiot Committee advised that the practice of using "millibar" to denote 1,000 C.G.S. units of pressure should be adhered to.

South Farnborough.—*Mr. Tunstall.*—Reported—that a difference of opinion had arisen between Mr. Tunstall, who had undertaken temporary duty at South Farnborough, and the landlady of the lodgings which the Office retains for the use of the Branch Office. As Mr. Tunstall represented that his expenses at South Farnborough, including the journey there and back, absorbed more than the whole of his pay, the Director was authorised to pay £3 in consideration of railway fare and incidental expenses of his journey to South Farnborough from Manchester and back.

Holyhead.—Reported—that Mr. F. M. Cotton had raised the question of an increase in the allowance to W. Davies, Observer at Holyhead, in consideration of increased duties and cost of living. In reply the point had been taken that it was not so much increase of pay as division of duty with a deputy which seemed desirable, but on Mr. Cotton's representation (M.O. 6616), that an additional allowance of £3 15*s.* a year, making up £70 a year for the whole work of the station would meet the case, the additional payment proposed had been sanctioned.

Approved.

Meteorological Office, Edinburgh.—Reported—the following statement by the Treasurer of the Scottish Meteorological Society for the year ended 31st March, 1918 :—

STATEMENT OF ACCOUNT OF SCOTTISH METEOROLOGICAL SOCIETY WITH THE METEOROLOGICAL COMMITTEE FOR YEAR ENDING 31ST MARCH, 1918.

Receipts.

	£	*s.*	*d.*
Balance carried forward	68	19	5
From the Meteorological Committee	350	0	0
On account of Reports supplied to the Registrar-General for Scotland	100	0	0
	£518	19	5

Expenditure.

	£	*s.*	*d.*	£	*s.*	*d.*
1. Salaries :—						
Superintendent ...	270	0	0			
„ Bonus ...	30	0	0			
Assistants	140	0	0			
„ Bonus ...	30	0	0			
Occasional Assistance	16	0	0			
				486	0	0
Workmen's Compensation Insurance					10	9
National Health Insurance ...				1	11	0
2. Furniture and Fittings					5	6
3. Binding Official Reports				4	2	0
4. Telephone—Rent for one Year ...				6	0	0
5. Registration of Telegraphic Address				1	1	0
6. Postage, Telegrams, and Petty Outlays				4	9	1
				£503	19	4
Balance carried forward				15	0	1
				£518	19	5

WILLIAM B. WILSON,
Hon. Treasurer.

697. ADVISORY COMMITTEE ON ATMOSPHERIC POLLUTION (Minute 689).—**Application for 1918–19.**—Reported—that in reply to the letter of application a request for further particulars as to the proposed researches had been received and the particulars supplied. The application probably awaits the statement of accounts, which is herein included in Minute 701.

The Director-General of the Ordnance Survey has raised the question of permission to reproduce portions of ordnance maps to illustrate the positions of the several gauges, and the Secretary has been requested to take the necessary steps in the matter.

698. METEOROLOGICAL SECTION, R.E.—**Mentioned in Despatches** (London Gazette, 21st May).—Major Gold*, D.S.O., Captains Bispham, Chapman*, Durward, Geddes, Sergeant F. V. Cox, Corporal R. M. Poulter*.

Establishment.—By W.O. letter 20/Engineers/5240 (A.G. 7. 6.) of 31st March, 1918, the establishment of the Meteorological Section (Home) is promulgated.

Captain C. J. P. Cave has been appointed *O.C., Meteorological Section* R.E. (*Home*).

The establishment is 7 Officers, 1 Staff Sergeant, 1 Sergeant, 6 Corporals, 3 Second Corporals, 58 trained men.

Promotions.—The following promotions have been published :—
Temp. Lt. D. Brunt, R.E., 20.1.18 ;
Temp. 2nd Lt. J. Durward, R.E., 12.3.18, to be Acting Captains, while employed as Meteorological Officers.

* M.O. Staff.

699. INSTRUMENTS.—**Stock on 31st March, 1918**: certified by Lieut.-Col. Lyons:—

Barometers, station	... ...	4
„ fishery	... ...	4
„ marine	... ...	40
Barographs, large	... ...	1
„ medium	... ...	27
Anemometers, pressure tube, Dines		3
„ cup, Robinson	...	10
„ swinging plate	...	17
„ cup, electric	...	30
Accessories for anemometers, electric:		
Cells, Leclanché	... ...	113
Bells	... ...	20
Pushes, bell	... ...	66
Anemobiagraphs	... ...	4
Airmeters	... ...	8
Anemometers, portable, Dines	...	1
Thermographs	... ...	5
Hygrographs	... ...	2
Barothermographs	... ...	—
Microbarographs	... ...	—
Anemometers, Duncan	... ...	2
Rain gauges, 8-in.	... ...	15
„ „ 5-in.	... ...	32
Measures, rain, 8-in. mm.	...	50
„ „ 5-in, mm.	...	124
„ „ 8-in. ins.	...	161
„ „ 5-in. ins.	...	143
„ „ testing, 8-in. mm.		4
„ „ „ 5-in. mm.		1
Rain gauges, marine	... ...	7
Hyetographs	... ...	2
Screens, Stevenson, ordinary	...	5
Stands for screens	... ...	5
Recorders, sunshine, tropical patt.		2 (complete)
Mounts, S.S. recorder	... ...	2
Spheres „ „	... ...	12
Apparatus, testing, S.S. recorder		1
Frames, focussing, for S.S. spheres		1
Gauges, brass, for S.S. spheres	...	2
Screens, wire	... ...	10
Cones, gale	... ...	10
Nephoscopes, Besson	... ...	7
„ Fineman	... ...	—
Goggles, pairs	... ...	15
Frames, exhibition	... ...	29
Brasses, telegram	... ...	20
„ fishery barometer	...	18
„ D.W.R.	... ...	15
Balances, balloon	... ...	33
Fillers, balloon	... ...	29
Slide rules, balloon	... ...	—
Meteorographs, kite, Dines patt.		2
„ „ Marvin „		1
Buzzers	... ...	50
Pens for lightning recorders	...	4
Protractor, brass	... ...	1
Scales, geostrophic	... ...	49
„ anemometer, Dines	...	4
„ sunshine	... ...	20
Buckets, canvas	... ...	16
Lamps, hand electric	... ...	12
Refills for do., 12 bs.	... ...	37
„ „ „ 800 bs.	... ...	13
Watches, stop	... ...	7
Slide rules, Mannheim	... ...	7
Actinometer, Michelson, in case		1
Cable, electric, yds.	... ...	304
Cages, wire	... ...	4
Altazimuths	... ...	2
Barometers, gauge	... ..	1
Cards, brass, in sets of 3 for testing S.S. recorders	... ...	1
Templates, brass, S.S. card	...	1
Tubes, thermometer, earth, 4-ft.		1
„ „ „ 2-ft.		1
„ „ „ 1-ft.		19
Hydrometers	... ...	89
Jars, hydrometer	... ...	10
Eidographs	... ...	1
Meteorographs, Assmann	...	—
Bottles, water	... ...	542
„ ink	... ...	234
Boxes, thermometer, empty	...	64
Candles	... ...	3790
Cases for slide rules	... ...	24
Gauges, brass, for rain gauge	..	1
Levels, spirit	... ...	2
Apparatus, wireless	... ...	1
Asbestos, sheets	... ...	17
Coherers, Marconi	... ...	5
Tools, anemometer, set	... ...	1
Apparatus, testing, P.T., anemom.		1
Inspectors' boxes	... ...	2
Gauges, pressure	... ...	6
Nipple and union	... ...	2
Valves, fine adjustment	... ...	4
Psychrometers, ventilating	...	2
Lanterns, paper	... ...	2705
Stands for solar radiation thermometers	... ...	26
Lanterns, cart	... ...	5
Cases, copper, thermometer	...	75
Thermometers, ordinary, Faht.	...	550
„ maximum „	...	20
„ minimum „	...	27
„ solar max. „	...	21
„ grass min. „	...	23
„ earth, 1-ft. „	...	5
„ „ 4-ft. „	...	7
„ special range	...	44
„ standard	...	4
„ Commonwealth		3
„ ordinary, Abs.	...	36
„ maximum „	...	10
„ minimum „	...	11
„ solar max. „	...	3
„ grass min. „	..	4
„ earth, 1-ft. „	...	3
„ „ 4-ft. „	...	3
Theodolites	... ...	11
Balloons, 48-in.	... ...	967
„ 60-in.	... ...	5377
„ 72-in.	... ...	3977
„ 84-in.	... ...	2571
„ 90-in.	... ...	3153
Key, lever, for hydrogen cylinder		1
Clock movement, lever, 8-day	...	1
Altigraph, Dines	... ...	1
Template, P.B. slide rule	...	1
Barograph, aviation	... ...	1
Kites	... ...	5

700. PUBLICATIONS.—Reported—the receipt of supplies of the following:—

Daily Weather Report.—New form with maps of "yesterday" on the first page, and maps for 1h. and 13h. of the day of issue as insets in the double page.

M.O. 225, i. **The Weather Map** (Repetition of Fourth issue) 7,000 copies printed.

M.O. 225, ii. **The Meteorological Glossary** (Repetition of Fourth issue) 7,000 copies printed.

M.O. 215. **The Seaman's Handbook** (Third edition) 10,000 copies printed.

M.O. 220*b*. **The Travel of Cyclonic Depressions,** Geophysical Memoirs, No. 12. 1,000 copies.

also final proofs of—

M.O. 230. **The Weather of the British Coasts.**

M.O. 238. **Cloud Forms** according to the International Classification, with an Atlas of Photographs of Clouds selected from the Collection of Mr. G. H. Clarke, of the Observatory, Aberdeen.

701. DIRECTORS REPORT AND ACCOUNTS :—

Notice has been received of the election of the Director as Foreign Honorary member of the American Academy of Arts and Sciences of Boston, Mass.

The Director has undertaken to give the Halley Memorial Lecture in the University of Oxford on 28th May, the subject being "The First Chapter in the Story of the Winds."

Professor McAdie, Director of Blue Hill Observatory, near Boston, U.S.A., called at the Office on 1st May, as Lieutenant-Commander in the United States Naval Reserve Force, and introduced eight Ensigns of the same service, who had come over to this country for Meteorological Work in connection with the U.S. Navy. After further consultation it was arranged that the officers should attend for a course of instruction from Thursday, 9th May, at 10 a.m., in order to gain acquaintance with M.O. methods. The course of instruction has been carried out.

Arrangements have been completed for the erection of a tower (with suitable means of access thereto) on the roof of the new Science Museum to carry the meteorological instruments which will be no longer serviceable on the Office roof in consequence of the higher elevation of the Science Museum. The Office is to bear the expense of the tower and fixing. The structure is designed to represent the "Standard M.O. Mounting for an anemometer," which exposes the vane at 40 feet above the base of a tower which itself measures 25 feet from base to apex.

Mr. R. J. Allison, of the Office of Works, has been very obliging in meeting the wishes of the Office in the matter.

Professor C. F. Marvin, Chief of the United States Weather Bureau, has addressed two communications to the Office on the nomenclature of units in Meteorological measurements. The first is on the use of the word "absolute" for the scale of Centigrade degrees measured from 273 degrees below the freezing point of water, which he rightly describes as loose scientific language, although scientific language can often be so described without serious reproach. It is possible that some arbitrary name like *tercentesimal scale*, abbreviated as *t*, would be the best means of defining the scale, as the *kilograde scale* is the name employed by Professor McAdie to denote the scale which has its zero at −273° C., and marks 1,000 as the freezing point of water. In that case the scale of Fahrenheit degrees measured from 459° below the F. zero might be called the "quingentesimal scale," and abbreviated as q.

The second communication refers to a divergence of practice which has been set up in the United States by the adoption of the name "kilobar" to denote 1,000 C.G.S. units of pressure instead of "millibar," which is in general use elsewhere, on the ground that Chemists and Physicists had already made use of the word "bar" to denote the C.G.S. absolute unit of pressure, and had thus established a prior claim to fix the meaning of the word. Professor Marvin gives a full history of the matter in the Monthly Weather Review for February, 1918, p. 73.

Accounts.—Submitted—the following Statement of the Bank Account in the Cash Book :—

	£	*s.*	*d.*
Balance on 19th March, 1918	252	4	8
Receipts from 20th March, 1918 to 21st May, 1918	10,501	5	6
	10,753	10	2
Cheques drawn from 20th March, 1918 to 21st May, 1918	8,699	10	11
Balance on 21st May, 1918	£2,053	19	3

Submitted—The following Statement of Accounts for the twelve months ended 31st March, 1918, prepared for audit by the Comptroller and Auditor-General :—

RECEIPTS.							PAYMENTS.					
1916-17. £ s. d.		£ s. d.	1917-18. £ s. d.		1916-17. £ s. d.			£ s. d.		1917-18. £ s. d.	
2,208 15 5	Balance from year 1916-17	—	2,047 13 5		1,000 0 0	Director	—		1,000 0 0		
22,500 0 0	Parliamentary vote	—	22,500 0 0			OFFICE SALARIES (including Insurance) :					
	DEPARTMENTAL EXPENSES REPAID :				9,355 17 1	Monthly	11,568 19 3				
2 9 0	Forecasts, &c. ..	1 17 6			1,682 4 11	Weekly	2,296 10 0				
	Marine, Statistical, and Administrative	75 12 9							13 865 9 3		
71 7 5						EXPENSES OF OFFICE :					
226 16 1	Instruments ...	451 4 8			688 8 11	Rent, Heating, and Lighting	693 2 0				
			528 14 11		122 16 0	Furnitureand Equipment	44 17 9				
	INCIDENTAL EXPENSES REPAID :				25 3 7	Library	22 11 10				
285 5 2	D.W. Report ...	335 15 4				Insurances and Repairs	72 0 11				
89 2 6	Divisional ...	93 3 1			73 5 11	Incidental Expenses, and Consumable					
7 12 10	Advertising Account	12 0 5			258 10 3	Stores	205 5 3				
			440 18 10		7 10 0	Advertising Account	7 10 0				
64 2 9	STATIONERY OFFICE	—	96 0 8						1,045 7 9		
	TELEGRAPH CHARGES REPAID	—	2,010 4 4		754 6 8	POST OFFICE :					
657 2 7					92 8 6	Postage	927 15 1				
	TELEPHONE CHARGES REPAID	—	1 14 11		3,177 14 4	Telephones	165 5 8				
1 7 8						Telegrams	3,839 5 2		4,932 5 11		
148 0 0	INSPECTIONS ...	—	114 9 6		70 1 5	STATIONERY OFFICE...	—		64 1 4		
	INSTRUMENTS :				203 3 1	TRAVELLING EXPENSES	—		141 1 8		
4,750 14 2	Royal Navy ...	2,958 0 3				SUPERANNUATION :					
4,161 19 6	By Sales from Stock	7,130 10 2			111 13 4	Pensions not chargeable on Fund ...	25 0 0				
	SUPERANNUATION ACCOUNT :		10,088 10 5		275 12 0	Pensions chargeable on Fund	243 19 4				
573 15 0	Annuities... ...	562 10 0			562 10 0	Annuities	562 10 0				
	Interest on Investments	46 5 9			237 10 0	Contribution to Fund	—		831 9 4		
32 5 6			608 15 9			COST OF INSTRUMENTS :					
	*OBSERVATORIES, BRANCHES, AND STATIONS :				4,743 13 2	Royal Navy	2,959 17 11				
					330 11 8	For Office use } Stock					
727 19 8	Richmond ...	638 19 2				Other commissions ... }	9,211 3 0				
1,021 2 7	Eskdalemuir ...	1,017 13 9			4,727 16 0				12,171 0 11		
31 8 5	Cahirciveen ...	30 3 2				*OBSERVATORIES, BRANCHES, AND STATIONS :					
294 1 3	Farnborough ...	326 4 0			2,134 2 2	Richmond	2,208 16 1				
13 1 2	Falmouth... ...	15 12 7			1,693 19 3	Eskdalemuir ...	1,631 3 6				
10 0 0	Benson	0 6 6			693 18 1	Cahirciveen... ...	747 7 7				
—	Edinburgh ...	—			520 12 3	Farnborough ...	618 15 1				
	Investigation of Atmospheric				262 3 11	Falmouth	327 9 5				
—	Pollution ...	500 0 0			480 7 6	Benson	551 18 8				
91 9 7	Miscellaneous ...	118 7 8			373 13 0	Edinburgh	364 12 3				
			2,647 6 10			Investigation of Atmospheric Pollution	291 4 9				
—	National War Bonds	—	13 0 0		—						
	Fire Insurance				1,360 7 10	Miscellaneous ...	1,331 19 10				
—	Claim	—	2 12 6						8,073 7 2		
	King George's				36,020 0 10						
—	Fund	—	4 0 0		—	King George's Fund	—		4 0 0		
					97 16 0	*Less* National War Loan Subscription	—		—		
	Less War Loan		41.104 2 1								
—	Subscription ...	—	97 16 0		35,922 4 10				42,128 3 4		
			41.006 6 1		1,964 6 4	BALANCE :					
	BALANCE DUE TO				83 7 1	Cash at Bank ...	—		—		
—	BANK	—	1,221 12 1			,, at Office ...	99 14 10				
									99 14 10		
£37,969 18 3			£42,227 18 2		£37,969 18 3				£42,227 18 2		

* For details, see separate statement.

Statement of Assets and Liabilities at 31st March, 1918.

LIABILITIES.				ASSETS.			
£ s. d.		£ s. d.	£ s. d.			£ s. d.	
3,674 13 10	To sundry creditors	6,868 12 0	2,047 13 5	By cash at Bank and at Office ...		99 14 10	
2 8 6	,, Superannuation	476 8 6	36 8 2	,, salaries reserved (premiums) ...		36 8 2	
—	,, balance due to Bank ...	1,221 12 1	717 1 7	,, M.O. instruments in stock ...		3,295 6 8	
2,336 10 0	,, balance	578 19 11	1,753 3 9	,, sundry debtors		3 316 17 10	
			1,459 5 5	,, Admiralty		2,397 5 0	
£6,013 12 4		£9,145 12 6	£6,013 12 4			£9,145 12 6	

NOTE.—On 31st March the amount of Government securities held for the provision of Superannuation Annuities was £26 14*s.* 2*d.* 2½ per cent. Consols, and £939 9*s.* 6*d.* 5 per cent. War Loan.

Observatories.—Statement of Accounts for the twelve months ended 31st March, 1918 :—

RICHMOND.

1916–17. £ s. d.	*Receipts.*	£ s. d.	1917–18. £ s. d.	1916–17. £ s. d.	*Payments.*	£ s. d.	1917–18. £ s. d.
164 0 0	Subventions, Scott Antarctic Fund	82 0 0		1,696 4 1	Salaries, Scheduled	1,788 2 10	
497 2 9	Gassiot Trust	405 2 4		37 5 3	Sunday and holiday duty	42 18 8	
			487 2 4				1,831 1 6
50 9 7	Expenses refunded locally ...		121 9 5	52 13 9	Cost of forms, &c.		27 2 9
3 3 7	Tests and Commissions		3 3 7	82 2 4	Rent, Rates, Taxes, Repairs and Insurance		44 1 1
13 3 9	Cost of books and forms refunded		27 3 10	101 15 7	Fuel and lighting		99 15 9
1,406 2 6	Balance		1,569 16 11	57 13 7	Equipment and instruments ...		42 10 4
				52 16 4	Consumable stores		109 1 11
				20 15 8	Incidental expenses		19 4 3
				5 9 8	Books, &c.		4 17 0
				25 13 11	Postage, telephones and telegrams		31 1 6
				1 12 0	Travelling expenses		—
£2,134 2 2			£2,208 16 1	£2,134 2 2			£2,208 16 1

ESKDALEMUIR.

£ s. d.		£ s. d.	£ s. d.			£ s. d.
1,000 0 0	Subvention, Royal Society ...	1,000 0 0	983 17 0	Salaries, Scheduled		1,177 9 7
21 2 7	Expenses refunded locally ...	17 13 9	66 2 3	Cost of forms, &c.		65 10 7
672 16 8	Balance	613 9 9	14 4 9	Rent, Rates, Taxes, Repairs and Insurance		13 0 7
			197 0 10	Fuel and lighting		194 12 9
			38 8 4	Equipment and instruments ...		31 8 3
			37 15 11	Consumable stores...		21 3 11
			8 16 5	Incidental expenses		6 13 7
			11 14 11	Books, &c.		4 11 2
			38 18 11	Postage, telephones and telegrams		40 0 9
			296 19 11	Travelling and motor car expenses		76 12 4
£1,693 19 3		£1,631 3 6	£1,693 19 3			£1,631 3 6

CAHIRCIVEEN.

£ s. d.		£ s. d.	£ s. d.			£ s. d.
9 19 5	Subventions (Rosse Fund) ...	5 13 2	520 2 2	Salaries, Scheduled		587 15 5
21 9 0	Expenses refunded locally ...	24 10 0	4 19 11	Cost of forms		2 9 7
662 9 8	Balance	717 4 5	54 7 11	Rent, Rates, Taxes, Repairs and Insurance		62 19 11
			19 5 5	Fuel and lighting		27 3 5
			69 5 0	Equipment and instruments ...		15 6 11
			8 9 5	Consumable stores		25 5 1
			1 12 2	Incidental expenses		4 18 8
			1 8 0	Books, &c.		1 8 0
			14 8 1	Postage, telephones and telegrams		19 13 7
			—	Travelling expenses		7 0
£693 18 1		£747 7 7	£693 18 1			£747 7 7

FARNBOROUGH BRANCH OFFICE.

£ s. d.		£ s. d.	£ s. d.			£ s. d.
250 0 0	Subvention (Advisory Committee for Aeronautics)	250 0 0	49 12 6	Salaries, Scheduled		347 15 6
44 1 3	Expenses refunded (War Office) ...	76 4 0	—	Cost of forms		3 0
226 11 0	Balance	292 11 1	—	Rent, Rates, Taxes, Repairs and Insurance		49 16 4
			4 5	Fuel and lighting		—
			368 17 1	Equipment and instruments ...		66 3 11
			24 1 10	Consumable stores...		73 7 3
			3 16 4	Incidental expenses		5 9 1
			1 8 0	Books, &c.		1 11 6
			72 0 5	Postage, telephones and telegrams		54 9 10
			11 8	Trave ling and motor car expenses		19 18 8
£520 12 3		£618 15 1	£520 12 3			£618 15 1

FALMOUTH WEATHER STATION.

£ s. d.		£ s. d.	£ s. d.			£ s. d.
13 1 2	Expenses refunded locally... ...	15 12 7	30 0 0	R. Cornwall Polytechnic Society		30 0 0
249 2 9	Balance	311 16 10	127 9 0	Salaries, Scheduled		204 19 0
			—	,, Additional		—
			34 2 11	Rent, Rates, Taxes, Repairs and Insurance		30 2 10
			1 7 2	Equipment and instruments ...		—
			1 0 11	Consumable stores		3 6
			17 11	Incidental expenses		3 13 6
			59 7 9	Postage, telephones and telegrams		58 7 7
			7 18 3	Travelling expenses		3 0
£262 3 11		£327 9 5	£262 3 11			£327 9 5

BENSON.

£ s. d.		£ s. d.	£ s. d.			£ s. d.
10 0 0	Expenses refunded locally ...	6 6	358 18 8	Salaries, Scheduled...		450 10 1
470 7 6	Balance	551 12 2	12 0	Overtime, &c.		1 13 6
			—	Cost of forms, &c.		—
			—	Rent, Rates, Taxes, Repairs and Insurance		1 0 0
			1 10 0	Fuel and Lighting		3 5 0
			81 15 1	Equipment and instruments ...		9 0 2
			16 18 6	Consumable stores		60 11 9
			2 17 0	Incidental expenses		2 14 5
			1 11 6	Books, &c.		10 6
			14 3 9	Postage, telephones and telegrams		22 13 3
			2 1 0	Travelling expenses		—
£480 7 6		£551 18 8	£480 7 6			£551 18 8

Meteorological Office, Edinburgh.

1916–17. £ s. d.		1917–18. £ s. d.	1916–17. £ s. d.		1917–18. £ s. d.
373 13 0	Balance	364 12 3	350 0 0	Subvention	350 0 0
			23 13 0	Travelling expenses	14 12 3
£373 13 0		£364 12 3	£373 13 0		£364 12 3

Adv. Com. Atmos. Pollution.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
—	Subventions	500 0 0	—	Salaries, Scheduled	135 11 4
			—	Overtime &c....	15 6 8
			—	Equipment and instruments ...	12 17 11
			—	Consumable stores	7 13 6
			—	Incidental expenses (including printing of report for 1915–16)	116 12 9
			—	Books, &c.	1 13 3
			—	Postage, telephones and telegrams	1 9 4
			—	Balance	208 15 3
£ —		£500 0 0	£ —		£500 0 0

Miscellaneous Stations.

£ s. d.		£ s. d.	£ s. d.		£ s. d.	£ s. d.
91 9 7	Cost of forms refunded	118 7 8	344 10 0	Subventions: Aberdeen, Armagh ...	344 10 0	
1,268 18 3	Balance	1,213 12 2	55 0 0	British Rainfall Organisation	55 0 0	
						399 10 0
			738 11 6	Salaries of Observers (38) ...		778 19 8
			—	Overtime		—
			133 12 6	Cost of forms, &c.		108 9 0
			6 9 0	Rent, Rates, Taxes, Repairs and Insurance		3 4 5
			—	Fuel and Lighting		1 0 9
			10 15 10	Equipment and instruments ...		3 12 8
			19 6	Consumable stores		—
			34 15 2	Agents' fees, &c.		16 13 5
			5 9 6	Books, &c.		4 17 11
			30 4 10	Postage, telephones and telegrams		15 12 0
£1,360 7 10		£1,331 19 10	£1,360 7 10			£1,331 19 10

METEOROLOGICAL FIELD SERVICE.

France.

£ s. d.		£ s. d.	£ s. d.		£ s. d.	£ s. d.
167 6 11	War Office	1,800 0 4		Salaries:		
276 17 7	Balance	857 12 0	35 18 8	Major E. Gold ...	67 9 2	
			15 9 8	Capt. A. H. R. Goldie	—	
			—	Lieut. E. H. Chapman	—	
			—	Lieut. C. D. Stewart	—	
			38 11 10	Sergt. R. Pyser ...	32 11 4	
			43 10 0	Corpl. E. L. Clinch	33 16 0	
			63 12 10	Corpl. A. G. Goad ...	71 10 10	
			—	Corpl. C. F. J. Jestico	34 0 8	
			—	Corpl. R. M. Poulter	25 10 3	
			197 3 0		264 18 3	
			116 15 6	Salaries refunded ...	2 11 0	
			80 7 6			262 7 3
				Incidental Expenses:		
			24 4 10	Postage	30 5 10	
			—	Telegrams ...	—	
			—	Printed books ...	4 11 0	
			15 4	Miscellaneous ...	7 5	
						35 4 3
			338 16 10	Instruments		2,360 0 10
£444 4 6		£2,657 12 4	£444 4 6			£2,657 12 4

Dardanelles.

£ s. d.		£ s. d.	£ s. d.		£ s. d.	£ s. d.
352 8 4	Admiralty	357 16 2		Salaries:		
760 10 10	War Office	2,128 15 3	19 5 8	Corpl. C. V. Ockenden	32 6 0	
789 6 2	Balance	—				32 6 0
			19 10 6	Salaries: Overtime		—
				Incidental Expenses:		
			13 13 2	Postage	15 7 9	
			1,297 9 9	Telegrams ...	1,438 9 10	
			—	Printed books ...	—	
			1 11 8	Miscellaneous ...	—	
						1,453 17 7
			550 14 7	Instruments		525 10 2
			—	Balance		474 17 8
£1,902 5 4		£2,486 11 5	£1,902 5 4			£2,486 11 5

EIGHTY-FIFTH MEETING.

South Kensington, S.W. 7, 29th May, 1918.

PRESENT :

SIR NAPIER SHAW, IN THE CHAIR.

Mr. BARSTOW. | The HYDROGRAPHER.
Captain HARVEY. | Dr. SCHUSTER.

LIEUT.-COLONEL LYONS (Acting Director).

702. A special meeting was summoned for this day to consider Treasury letter 12330.

12330/18.

Treasury Chambers,
24th May, 1918.

SIR,

I AM directed by the Lords Commissioners of His Majesty's Treasury to state for your information that They have received a letter from the Air Ministry suggesting that the control of the Meteorological Office should be transferred to the Air Council. I am to say that My Lords think it would be desirable, before a decision is taken on this important subject, that a conference should be held between representatives of the departments principally concerned, and They accordingly request that you will nominate representatives to attend a meeting which will be held in this Office at 11.30 a.m. on Friday, the 31st instant, in Mr. Baldwin's room.

A similar invitation is being addressed to the War Office, Admiralty, Royal Society, Board of Trade and Board of Agriculture and Fisheries.

I am, &c.,
T. L. HEATH.

The Director, Meteorological Office.

The Chairman reported that he had nominated himself and Col. Lyons as representatives of the Office at the Conference, assuming that the nomination of other members of the Committee would be made by the other bodies to which the invitation had been addressed.

After discussion general approval was given to the idea of an independent Central Meteorological Institute for meteorological information and scientific investigation, while each of the several fighting services or other departments requiring specialised meteorological work would have its own sub-service, in preference to the idea of one of the fighting services undertaking the administration of an office intended to serve not only the special department to which it was attached but all the other departments and the general public, as well as the general duties of scientific investigation in meteorology and the cognate subjects.

703. METEOROLOGICAL SECTION, R.E.—Reported—that Lieutenant C. D. Stewart, R.E., was returning to civil duties, "having relinquished his commission on account of ill-health caused by wounds received in action, and is granted the honorary rank of Lieutenant." 2nd June.

It was agreed that in view of the fact of his having reached the maximum of the class of Junior Professional Assistants in 1917, upon his return he should be promoted Senior Professional Assistant, with commencing salary of £225, together with the War Bonus allowed under Minute 675.

EIGHTY-SIXTH MEETING.

South Kensington, S.W. 7, 26th June, 1918.

PRESENT :

SIR NAPIER SHAW, IN THE CHAIR.

DR. SCHUSTER. | COLONEL LYONS.

704. The Minutes (692–701) of the Meeting of the 22nd May, and the Minutes (702–703) of the Meeting of the 29th May, previously circulated, were taken as read and confirmed.

705. CORRESPONDENCE.—**Treasury.**—Reported—that the following reply had been sent by Sir Napier Shaw to the Treasury letter approving the appointment of Sir Napier Shaw Adviser in Meteorology and Colonel Lyons as Acting Director of the Meteorological Office :—

M.O. 7,041.

SIR, 24th May, 1918.

I BEG leave to acknowledge the receipt of Treasury Letter 18329/18 in reply to a letter from this Office of 25th January last and to say that the letter was laid before the Meteorological Committee on Wednesday 22nd.

I was instructed to return to Their Lordships the thanks of the Committee for their approval of the proposal "that Sir Napier Shaw shall for the period of the war become Scientific Adviser to His Majesty's Government on Meteorology and retain the Chairmanship of the Meteorological Committee, Lieutenant-Colonel Lyons, with the consent of the War Office, being appointed Acting Director for the same period" on the terms set out in the letter under reference.

The Committee noted that Lieut.-Colonel Lyons will be appointed Accounting Officer for the Meteorological Office Grant and will continue to represent the interest of the Army Council on the Committee.

I am to say that the Committee propose to date the arrangements as to salaries from 1st May, 1918.

I beg you also to thank Their Lordships for the appreciation of the work that I have done in the administration of the Office with which I have now been associated for twenty-one years.

I am, &c.,
NAPIER SHAW.

The Secretary,
H.M. Treasury,
S.W. 1.

Read—the following letter from the Treasury granting advances on the Vote of Credit :—

19932/18.

Treasury Chambers,
SIR, 7th June, 1918.

I HAVE laid before the Lords Commissioners of His Majesty's Treasury your letter of the 17th ultimo further relative to the financial position of the Meteorological Committee.

My Lords understand that the Committee will at once take steps to recover from the Government Departments concerned amounts due from them for instruments supplied, and that arrangements will, if necessary, be made for the payment of a substantial portion of the Committee's claim on account and subject to adjustment later if necessary. It should also be considered whether payment cannot be made (subject to adjustment) on notification from the Committee to the paying officers that instruments have been supplied without deferring the claim until an acceptance from the receiving officer can be produced to the paying officer.

My Lords understand that even when the above steps are taken there will be a considerable stock of instruments always in hand which have not yet been allocated to any Department and in order to enable your Committee to be in a position to carry this stock until disposed of They are authorising an advance to you from the Vote of Credit of £2,000. This arrangement will no doubt require reconsideration at a later date and They would be glad to receive in 12 months time a statement showing for each quarter the value of instruments paid for but not yet disposed of to Government Departments.

My Lords further authorise the issue to you of £1,750 from the Vote of Credit in respect of special war expenditure on staff, &c.

An Order for the above amounts is enclosed.

I am, &c.,
M. G. RAMSAY.

706. METEOROLOGICAL SERVICE FOR AIR MINISTRY (Minute 702).—Reported—that on 31st May a Conference was held at the Treasury on the proposal of the Air Ministry to take over the Meteorological Office. Representatives of the Admiralty, War Office, Air Ministry, Board of Trade, Board of Agriculture and Fisheries, the Meteorological Office, the Royal Society, and the Treasury were present.

707. PUBLICATION OF METEOROLOGICAL INFORMATION (Minute 693).—Reported—that a Conference had been held at the Admiralty to consider the publication of weather-information and any restrictions that might be necessary. The Hydrographer and representatives of the Naval Meteorological Service, the Naval Intelligence Department, the Director of Military Intelligence, the Press Censor, and the Meteorological Office were present.

708. OFFICE STAFF.—**Miss G. D. Little.**—Reported—Order 698, appointing Miss G. D. Little, B.Sc., as Professional Assistant in the Forecast Division at a salary of £175 per annum with War Bonus in addition from June 10th, 1918.

Approved.

Miss G. C. Reid.—Reported—Orders 700 and 713 appointing Miss G. C. Reid as temporary assistant in the Library from 18th June, 1918, to 22nd August, 1918, at a salary of £125 per annum in addition to War Bonus.

Approved.

Miss E. E. Austin.—Reported—Order 709 appointing Miss E. E. Austin, Mathematical Tripos and Natural Sciences Tripos Cambridge, as secretary to the Adviser at a salary of £150 per annum in addition to War Bonus from 8th July, 1918.

Approved.

Miss E. F. Walker.—Reported—Order 714 appointing Miss E. F. Walker, M.Sc. Leeds, as Librarian at a salary of £225 including War Bonus from 19th August, 1918.

Approved.

C. E. Goad.—Recommended—that C. E. Goad, Acting Senior Office-keeper, should be confirmed in this appointment.

Approved.

C. D. Stewart.—Reported—that Lieutenant C. D. Stewart having relinquished his commission from the 2nd June, 1918, on account of ill-health caused by wounds received in action, had rejoined the Staff of the Meteorological Office.

Miss M. Pickthall.—Reported—that Miss M. Pickthall had resigned her appointment as Librarian on account of ill-health as from 1st June, 1918.

709. OBSERVATORIES.—**Eskdalemuir.—Miss M. Ure.**—Reported—Order 710 appointing Miss M. Ure as temporary clerk at Eskdalemuir for three months on probation from 25th July, 1918, and subsequently until 31st July, 1919, with a salary of £1 3*s.* per week in addition to War Bonus, and free quarters or in lieu thereof 5*s.* per week lodging allowance.

Falmouth.—R. E. Watson.—Reported—that Mr. R. E. Watson, B.Sc. (late Lieut. R.G.A.) had been appointed Meteorologist-in-Charge at Falmouth Observatory, in place of Mr. P. Y. Alexander who had resigned.

The thanks of the Committee were given to Mr. P. Y. Alexander for the assistance that he had rendered in taking charge of the Observatory from March, 1917, to June, 1918.

Farnborough.—The location of thunderstorms by directional wireless was further considered, and it was decided that the Admiralty and the Air Ministry should be asked whether they would support the proposal to proceed actively with the practical ultilization of the investigations which had been carried out at Farnborough, and if favourable replies were received that steps should be taken to equip and provide staff for three stations as soon as possible.

710. PUBLICATIONS.—**Manual of Meteorology.**—Reported—that the Manual of Meteorology had been commenced by Sir Napier Shaw. Authority was given to

Sir Napier Shaw, as Adviser, to make an agreement with the Cambridge University Press for the publication of a Manual of Meteorology on the understanding that copies should be supplied to the Office for the use of the Services at approximately cost price, and that the Meteorological Office should render assistance as regards the use of blocks and otherwise.

711. DIRECTOR'S REPORT AND ACCOUNTS :—

Forecast Division.—Reported—that in order to secure a better control of the preparation of forecasts and warnings, Mr. R. G. K. Lempfert, Superintendent, and Mr. J. S. Dines, Assistant-Superintendent, were alternately superintending the preparation and issue of the weather reports. This arrangement has been found necessary in consequence of the varied character of the reports which are being demanded.

Approved.

Accommodation.—Reported—that the accommodation in the present building being no longer sufficient, H.M. Office of Works has been asked to provide additional accommodation by the erection of temporary buildings on the roof or by other means.

Accounts.—Submitted—The following statement of the Bank Account in the Cash Book :—

	£	s.	d.
Balance on 21st May, 1918	2,053	19	3
Receipts from 22nd May to 25th June, 1918	5,551	5	1
	7,605	4	4
Cheques drawn from 22nd May to 25th June, 1918	4,976	7	4
Balance on 25th June, 1918	£2,628	17	0

EIGHTY-SEVENTH MEETING.

South Kensington, S.W.7, 21st August, 1918.

PRESENT :

SIR NAPIER SHAW IN THE CHAIR.

COLONEL GLENNIE.	COLONEL LYONS.
CAPTAIN HARVEY.	MR. MIDDLETON.
THE HYDROGRAPHER.	DR. SCHUSTER.

712. The Minutes (704–711) of the last Meeting (26th June, 1918), previously circulated in type-script, were taken as read, and confirmed.

713. CORRESPONDENCE.—**Treasury.**—Reported—the receipt of the following Treasury Minute :—

30336/18.

My Lords read their Minute of 20th May, 1905 respecting the constitution of the Meteorological Committee.

They are pleased to appoint as an additional member of the Committee Captain Robert W. Glennie, C.M,G., R.N., who has been nominated by the Air Council to represent the Air Ministry on the Committee.

The correspondence which accompanied the Minute is as follows :—

30336/18.

Treasury Chambers, S.W. 1,
9th August, 1918.

SIR,

I AM directed by My Lords Commissioners of His Majesty's Treasury to transmit herewith copy of correspondence as shown below.

I am, &c.,
T. L. HEATH.

The Director,
Meteorological Office.

From Air Ministry to H.M. Treasury.

45739/1918

Air Ministry,
Strand, W.C. 2.
2nd August, 1918.

SIR,

1. I AM commanded by the Air Council to acknowledge the receipt of your letter of the 17th ultimo (27553/18) and to state that they have given careful attention to the contents of the letter to the Meteorological Office enclosed therewith concerning the relation between the Air Ministry and that Office.

2. The Air Council appreciate the importance of securing that the knowledge and experience possessed by the Meteorological Office should be utilized by the Air Ministry, and they will be glad to accept the offer of representation at the Committee. They have also considered the possibility of an arrangement being made whereby the requirements of the Air Force in regard to meteorological information would be met in their entirety by that Office.

3. The Air Council are, however, decidedly of the conclusion that no such arrangement could meet the vital necessities of the Air Service.

Meteorology has, in their view, a greater and more direct interest to the Air Force than to any other Department, and its importance in the development of aviation is increasing and, indeed, can hardly be over-estimated. The study and application of this science has, moreover, certain aspects, in relation, for example, to the question of flying at high altitudes which are entirely peculiar to aviation, and the Air Council consider it to be essential that the Flying Service should be furnished with a Department of Meteorology in immediate contact with the needs of the Flying Service and staffed by a personnel directly responsible to the Air Council.

4. With a view, however, to avoiding any unnecessary duplication of functions between public Departments, the Air Council have thought it advisable to confer with the Admiralty, and that Department is prepared to transfer the Naval Meteorological Service to the Air Ministry as from the 15th instant, subject to the retention within the Admiralty of sufficient personnel to provide for the forecasts and distribution of meteorological information for purely Naval purposes.

5. The details of the arrangements for the transfer would require to be adjusted between the departments but, speaking generally, all existing Naval Meteorological Stations would be turned over to the Air Ministry, together with the Meteorological Officers, huts and instruments at these stations. The non-commissioned ranks at these stations, it may be observed, already consist of Air Force personnel on loan to the Admiralty. It is a condition of the arrangement that the reports made by Meteorological Officers at the various Air Force Stations should be available for Admiralty purposes.

6. The Staff gradings for which I am to ask for the sanction of Lords Commissioners of H.M. Treasury in connection with the establishment of the Meteorological Service under the Air Ministry are as follows :—

1. S.O. 1.
4. S.O. 2.
8. S.O. 3.

7. Of these posts, 7 would be filled by transfer of Officers at present engaged in the Admiralty Meteorological Service ; one of them would be the present Director of the Naval Meteorological Service, Captain Glennie, C.M.G., R.N., whom it is proposed to appoint as S.O. 1 in charge of the Service.

8. The Air Council would propose that Captain Glennie should in that case act as the representative of the Air Ministry on the Meteorological Committee.

9. The Air Council trust that in view of the proposed date of the transfer of functions, that these proposals may receive their Lordships' very early consideration.

I am, &c.,
W. A. ROBINSON.

The Secretary,
The Treasury,
Whitehall, S.W. 1.

From Treasury to Air Ministry in reply.

30336/18.

Treasury Chambers,
9th August, 1918.

SIR,

I HAVE laid before the Lords Commissioners of His Majesty's Treasury your letter of the 2nd instant (45739/1918), respecting the relation between the Air Ministry and the Meteorological Office.

They note with satisfaction that the Air Ministry accept the offer of representation on the Meteorological Committee, and they have accordingly appointed Captain R. W. Glennie, C.M.G., R.N., to be a member of the Committee. A copy of the Minute of appointment is enclosed herewith.

My Lords note that by agreement with the Admiralty the Naval Meteorological Service will be transferred to the Air Ministry as from the 15th instant, including both personnel and material subject to certain adjustments. My Lords sanction the creation of a post of Staff Officer 1st Grade in charge of the service at the Air Ministry, to which post Captain R. W. Glennie, the present Director of the Naval Meteorological Service will be appointed and the transfer of 6 Naval Officers.

The Air Council seek authority for the appointment of 13 Staff Officers in all to the Air Meteorological Service. Before my Lords can agree to this proposal, they would be glad to receive a statement in greater detail showing the proposed distribution of the work between them. Is it intended that the whole of this number of officers shall be employed at the Air Ministry ?

My Lords trust that all possible steps will be taken to prevent unnecessary duplication of work with the Meteorological Office.

I am, &c.,
ROBERT CHALMERS.

The Secretary,
Air Ministry.

Colonel Glennie took his place as an additional member of the Committee.

Colonial Office.—*Hurricanes and Hurricane Conditions.*—Submitted—the following correspondence :—

M.O. 3727.

Meteorological Office,
South Kensington, S.W. 7.
19th March, 1918.

SIR,

I BEG leave to acknowledge the receipt of a duplicate of Colonial Office letter 51516/1917 of 13 November, 1917. I regret that the original is missing from our files.

With reference to the first paragraph, it would be quite in accord with the usual tracks and rate of travel of West Indian Hurricanes for a gale and rain-storm to pass from Dominica to Jamaica as the Administrator of Jamaica assumes, and four days would be an ordinary time for the journey.

There appears to have been some change in the character of the disturbance, as the damage to roads in Dominica was attributable to heavy rain-fall, whereas there were violent winds in Jamaica. This change in the character of the disturbance is noteworthy ; it may be of some importance in the study of West Indian Hurricanes.

Mr. Walter Long is good enough to offer any further reports on the storm of 20–21 September which may be received from Jamaica and the Cayman Islands. I shall be very glad to receive them. Our practice with regard to such reports is to put those for each occasion together and make a short note for publication on the back of the Monthly Meteorological Charts of the Atlantic and Mediterranean ; and the practice can be followed in this case.

That, however, is not really sufficient. West Indian Storms and Hurricanes are a special department of meteorological inquiry of obvious economic importance, which might certainly be in the regular charge of some official either colonial or imperial.

Hitherto in this Office the subject has been treated simply as part of the general subject of marine meteorology in charge of the Marine division, the original nucleus of the Office. Without a good deal of expansion, which we look forward to as a part of reconstruction, we cannot deal adequately with such special subjects as the Hurricanes of the West Indies, which form a special group, just as do those of the South Indian Ocean near Mauritius, or those of the Eastern Seas and Philippine Islands, or those of the Arabian seas or the Bay of Bengal.

So far as the storms of the West Indies are concerned, the Weather Bureau of the United States has taken the matter up and established a system of reporting stations and signal stations including the British West Indies. Though this has perforce been acquiesced in by this Office, it is not quite proper to leave the economic interests of British Colonies in the hands of the more wealthy meteorological establishment of a friendly power, and as soon as possible it might be changed and a scheme of co-operation introduced.

The first point to be decided is whether the subject should be regarded as an imperial or a colonial matter. In support of its being an imperial matter is the fact that it concerns jointly a number of separate colonial governments. The Unites States treat the matter as an affair of the central government at Washington, not as of the State of Florida or Texas. If Mr. Walter Long is disposed to take a similar view and consider that the subject should be dealt with as an imperial question, this Office will do its best to discharge the duty which would fall upon it in that connexion by making West Indian Storms and Hurricanes a definite subject of study which would naturally be combined with the study of similar storms and hurricanes affecting Mauritius and Réunion on the one hand, and those affecting Hong Kong and the China coast on the other. The Indian Government already deals with those of the Arabian Sea and the Bay of Bengal.

I am, &c.,
NAPIER SHAW.

The Under-Secretary of State for the Colonies,
Colonial Office,
Downing Street, S.W. 1.

13839/1918.

M.O. No. 5082.

Downing Street,
16th April, 1918.

SIR,

I AM directed by Mr. Secretary Long to acknowledge the receipt of your letter of the 19th March (3727) commenting on the statement of the Administrator of Dominica that the storm which passed over that island on the 20th–21st September last was caused by the same atmospheric disturbance as the hurricane in Jamaica on the 23rd of the same month.

2. I am to transmit to you the accompanying copy of a report on the Jamaica hurricane.

3. With regard to your proposal that the study of hurricanes and hurricane conditions, as affecting the Colonies, should be undertaken by a central authority, I am to inform you that Mr. Long recognises the importance of the subject, and is consulting the Admiralty and the Board of Trade. A further communication will be addressed to you on the matter in due course.

I am, &c.,
G. GRINDLE.

The Director,
Meteorological Office.

36572/1918.

M.O 11034.

Downing Street,
12th August, 1918.

SIR,

WITH reference to paragraph 3 of the letter from this Department of the 16th April last, I am directed by Mr. Secretary Long to transmit to you the accompanying copies of letters from the Admiralty, Board of Trade and Air Ministry, expressing general agreement with the suggestion that the study of hurricanes and hurricane conditions, as affecting the Colonies, should be regarded as an Imperial matter, and should be undertaken by a central authority, preferably your Department.

2. I am to suggest that it would be of advantage at the present stage if you would take steps in consultation with this Department to formulate some definite proposals which could be laid before the Treasury and the Colonial Governments concerned.

I am, &c.,
G. GRINDLE.

The Director,
Meteorological Office.

M. 19117.

Admiralty,
26th April, 1918.

SIR,

WITH reference to your letter No. 13839 of 16th April, I am commanded by My Lords Commissioners of the Admiralty to acquaint you that they concur in the views of the Meteorological Office that the study of hurricanes and hurricane conditions, as affecting the Colonies, should be regarded as an Imperial matter, and undertaken by a central authority, preferably the Meteorological Office.

2. My Lords consider that a thorough investigation of a subject affecting such widely scattered areas could be carried out satisfactorily only in this manner.

3. It appears probable that a thorough knowledge of this subject will prove of immense importance in connexion with the growth of aerial navigation which may be expected in the future.

I am, &c.,
O. E. MARRACK,
For Secretary.

The Under Secretary of State,
Colonial Office.

M. 5983.

Board of Trade
(Marine Department),
7, Whitehall Gardens,
London, S.W. 1.
30th May, 1918.

SIR,

WITH reference to your letter of April 16th (13839/1918) respecting the study of hurricanes and hurricane conditions in the West Indies, I am directed by the Board of Trade to state that it might be of advantage to British shipping if information of this kind relating to the West Indies could be dealt with by a British authority; but if this authority could co-ordinate all information of this kind received, not only from the West Indies but also from the Eastern Seas, there would be greater reason from the point of view of the British Mercantile Marine for supporting the proposal. As the Meteorological Office appear to be prepared to take up this question and deal with it as a whole, the Board of Trade are in favour of the matter being entrusted to that Office.

I have, &c.,
C. HIPWOOD.

The Under Secretary of State,
Colonial Office, S.W. 1.

Air Ministry,
Strand, W.C. 2.
26th July, 1918.

SIR,

I AM commanded by the Air Council to say that they have had under consideration your letter 20593/1918 of 20th May respecting the study of hurricanes and hurricane conditions as affecting the Colonies.

The Air Council consider that the study of the subject and the dissemination in due course of the results of such study will be of the greatest importance, particularly from the point of view of the future development of peaceful aerial traffic. The question is dealt with at some length in the report of the Civil Aerial Transport Committee now being prepared for publication.

In the particular case of the study of hurricanes in the West Indies and the other parts of the world mentioned on page 2 of Sir Napier Shaw's letter of 19th March the Air Council fully agree that it should be regarded as an Imperial matter, understanding that the meaning of this expression is that the necessary organization should be established and the work done by the Meteorological Office, the cost being defrayed in the first instance from the vote for that Department. Whether, when a specific scheme for the purpose has been formulated, contributions towards the cost should be invited from the Governments of the various Dominions, Colonies, and Protectorates which will benefit from it, and if so in what proportions, would be primarily a matter for Mr. Long's consideration. But the first step would, in the opinion of the Air Council, appear to be to invite Sir Napier Shaw to formulate for the consideration of the Departments concerned a definite scheme of organization for the regular collection and dissemination of meteorological information relating to the hurricane centres mentioned in his letter. From the point of view of the Air Council it would be desirable that such scheme should have special regard to the requirements of aircraft assumed to be operating in the regions in question.

I am, &c.,
W. A. ROBINSON.

Under Secretary of State,
Colonial Office.

M.O. 11064.

Meteorological Office,
South Kensington, S.W. 7.
13th August, 1918.

SIR,

I BEG to acknowledge the receipt of your letter 36572/1918 of the 12th August with reference to the study of hurricanes and hurricane conditions. I am in consultation with the Adviser of Meteorology, Sir Napier Shaw, on the subject, and I hope shortly to transmit to you the definite proposals for which you ask.

I am, &c.,
H. G. LYONS,
Colonel, Director.

The Under Secretary of State,
Colonial Office, S.W. 1.

The following memorandum was approved for communication to the Colonial Office :—

METEOROLOGICAL OFFICE.

Proposed Inquiry Concerning Hurricanes in the West Indies, and Other Parts of the World.

The information which the Meteorological Office puts forward officially concerning tropical revolving storms includes a chapter in the *Barometer Manual for the Use of Seamen*, which gives a table of the number of hurricanes in different parts of the World in several months of the year, the general characteristics of tropical revolving storms, and instructions as to the best method of procedure in order that a ship may anticipate their approach and avoid the worst consequences. The table and the instructions may be traced back to Dove's *Law of Storms*. The chapter as now issued is a revised edition, expressed in the language of cyclonic depressions which has been introduced since Dove's time.

The Office has also issued as a separate publication charts of the tracks of hurricanes in the South Indian Ocean, prepared by Dr. Meldrum of the Observatory of Mauritius. After the stock was exhausted the charts were reproduced on the *Monthly Meteorological Charts of the Indian Ocean*. On those charts are also given some tracks of cyclonic storms in the Arabian Sea and the Bay of Bengal.

Reports of hurricanes occasionally received at the Office are noted on the Monthly Meteorological Charts of the Atlantic or of the Indian Ocean according to the locality from which the reports come.

Meanwhile the Baguios or tropical revolving storms of the Philippine Islands and China Seas have been fully dealt with in two works by Father Algué, Chief of the Weather Bureau of the Philippines. The hurricanes of the West Indies have also been discussed in a number of contributions to the Monthly Weather Review and other publications of the Weather Bureau of the United States. The cyclones of the Arabian Sea and the Bay of Bengal were the subject of special study by the late Sir J. Eliot in two books issued under his direction by the Indian Government. There is a large miscellaneous literature bearing on the subject in the Meteorological Journals.

The first stage of the proposed inquiry is to summarise the information contained in these separate works and to arrange for reports of hurricanes to be collected in an organized manner from the Governments of the British Dominions which experience these visitations, probably by a scheme of co-operation and exchange. By this means information will be available in a compendious form, not only for those seamen who may on occasion expect to meet with a hurricane and who are doubtless already glad to consult the detailed works for the special localities, but also for administrative bodies, whether of Government or of shipping or aircraft companies, for all students of navigation of the sea or the air, and for all students of meteorology.

But the subject requires further study from the scientific point of view, especially in the interest of aerial navigation. A tropical revolving storm is accepted as typical of a travelling column of revolving fluid, of which the tornado, the sand-whirl and the water spout are examples of smaller dimensions. The ideas suggested by them have marked out the line of thought followed by all meteorologists in regard to the travel of cyclonic depressions. Theory in the subject has up to now been singularly unproductive of practical results, but now circumstances have changed. Lord Rayleigh has given an outline of the theory of revolving fluid in a form which enables a competent meteorologist to examine the ascertained phenomena of revolving storms again from that point of view in conjunction with certain experiments of Dr. J. Aitken, which must have a bearing upon the phenomena, and also to examine the theoretical question of stability of rotary motion in the atmosphere upon which the whole structure of atmospheric motion must depend. Recent work at the Meteorological Office has made it clear that we are now in a position to discuss such questions as : what causes guide the path of a cyclone, how far up the atmosphere a revolving column can or must extend, and whether or not it can originate at any specified level. Now that aerial navigation is in a position to supply data for levels up to 25,000 feet, the whole dynamical history of revolving fluid in the atmosphere ought to be explored with a view to finding out, if not their origin, at least the laws of their travel.

Further it may be noted that a tropical revolving storm passes by insensible gradations as it travels into the form of the cyclonic depressions which is the key to our own weather. The process of transition can now be analysed and explained by the accumulation of examples for examination.

To conduct the inquiry a meteorologist is required duly qualified in mathematics and physics, who has sufficient experience of the practical limitations of meteorological study. He should, if possible, direct and, if not, work in the closest conjunction with the department which compiles and distributes the information about hurricanes, so that the data may be classified in the most productive form. Experience has shown that a mathematician requires some years of association with practical meteorological work before he realises the form in which the available material presents itself, and on the other hand a stereotyped form of recording experiences sometimes buries the most salient facts.

The special needs of the inquiry are therefore :—

(1) A scientific inquirer who may be called a mathematician, with a junior as his assistant to draw up the summary of existing knowledge and carry out the dynamical inquiry. The work would require the whole time of these officials for a year, and subsequently, "until otherwise ordered," about a quarter of their time.

(2) A specially designated member of the Collecting Staff of the Office to take charge of the data as they come in and put them in order for inspection and subsequently for issue. This work would require the whole time of this official for three months and subsequently a quarter of his time. The remaining requirements are ordinary clerical work and the machinery of distribution, which are part of the regular work of the Office.

Under existing conditions these requirements can best be met by the engagement of two University graduates and two tabulating and computing clerks, including such draughtsman's work as may be necessary, to work in connection with the staff of the Meteorological Office, and under its direction. The estimated expenditure thereby incurred would be £800 per annum.

Mining Magazine (Minute 691).—At the request of "The Mining Magazine" authority has been given for the Weekly Magnetic Tables to be communicated to that journal for publication in the interest of the metalliferous mines.

In the course of conversation on the circulation of meteorological information contained in periodical publications it was agreed that the question be reconsidered with the authority of the Censor's Office.

Comité d'Action des Services Météorologiques Français.—The following letter from the Comité d'Action des Services Météorologiques Français was read :—

M.O. 9005.

Paris,
29 Juin, 1918.

Comité d'Action des Services
Météorologiques Français.

Le Sécretaire Perpétuel de l'Académie des Sciences, President du
Comité d'Action des Services Météorologiques Français,
à Monsieur le Directeur du Meteorological Office,
South Kensington, London, S.W. 7.

J'ai l'honneur de vous envoyer ci-joint un exemplaire du Code de Transmission des Observations Météorologiques adopté par le Comité d'Action des Services Météorologiques Français et qu'emploieront toutes les stations françaises à partir du 1er Août 1918.

Ainsi que vous pourrez le constater, ce code ne modifie pas la forme des messages adoptée par les Comités Internationaux, il la complète seulement pour tenir compte des besoins actuels des services météorologiques militaires.

Il y aurait le plus grand intérêt à adopter dans toutes les nations alliées le même code de transmission des observations. La traduction des messages, rédigés suivant des codes différents pour chaque pays, complique en effet d'une façon appréciable la tâche des services chargés de la prévision du temps.

Je m'empresserai de porter à la connaissance du Comité d'Action des Services Météorologiques Français les observations que vous voudrez bien me présenter relativement à la rédaction du code que je vous communique aujourd'hui et j'espère que nous arriverons à une entente générale pour l'adoption d'un code unique

Veuillez agréer, Monsieur, l'assurance de ma haute considération.

Pour le Président et par ordre
Le secrétaire général
J. ROUCH.

The Director explained that he had replied as follows, as the correspondence refers evidently to the transmission of meteorological information under ordinary conditions and does not propose the coding as taking the place of a secret cypher when such is necessary :—

M.O. 11209.

SIR, 15th August, 1918.

I BEG to acknowledge the receipt of your letter of the 29th June, 1819, and I regret the delay in replying to it, which has been due to exceptional circumstances.

The code for transmitting meteorological observations which you have sent seems to meet the requirements of this Office in most respects so far as the arrangement of the information is concerned.

I am proceeding to France on the 23rd August, and I expect to be in Paris two or three days later with Lieut.-Colonel Gold, Commandant of the British Meteorological Service in France ; I will, therefore, avail myself of this opportunity to meet you and discuss the points which arise in connection with it.

I am, &c.,
H. G. LYONS, Colonel,
Director of Meteorological Office,
and Commandant Army Meteorological Services.

Le Président,
Comité d'Action des Services,
Météorologiques Français,
176 rue de l'Université,
Paris, France.

714. METEOROLOGICAL SERVICE FOR AIR MINISTRY (Minute 706).—The Director explained the present position with regard to the supply of information for the use of the Royal Air Force, and the Director of the Meteorological Service R.A.F. undertook to report any further requirements which might be found to be necessary.

715. OFFICE STAFF.—**Exemptions from Military Service.**—Reported—that a meeting of the Military Service Committee appointed by the Ministry of National Service to review the staff of military age in the Meteorological Office was held at the Office on Thursday, 1st August, 1918, at 11 a.m. Lord Charnwood in the Chair and Mr. H. Evans-Austin attended as representatives of the National Service Ministry, Sir Napier Shaw and Colonel H. G. Lyons as representatives of the Meteorological Office,

and Mr. R. Corless as Secretary. The work of the Meteorological Office having been generally explained the consideration of each of the thirty cases of men now in the employ of the Office who are of military age, as defined by the Military Service Act, 1916, was proceeded with and the decisions were reported to the Office on 7th August, 1918.

Reported—that Captain E. H. Chapman, R.E., had been attached to the Meteorological Office for temporary duty.

Employees of Alien Parentage.—Reported—that the necessary steps had been taken to comply with the requirements of the Committee appointed to examine these cases.

New Appointments.—Reported—the following Director's Orders for confirmation :—

Order 727 appointing **Miss L. F. Lewis**, B.Sc., Senior Professional Assistant in the Forecast Division at a salary of £225 with additional War Bonus. To date from 26th August, 1918.

Order 732 appointing **Miss D. G. Lee** Probationer in the Forecast Division at a salary of £75 per annum with additional War Bonus of 9*s.* per week. To date from 26th August, 1918.

Order 729 appointing **S. R. Rozier** Boy Clerk in the Forecast Division at 16*s.* a week with additional War Bonus of 7*s.* a week. To date from 2nd September, 1918.

Order 728 appointing **W. A. Kimber** Boy Clerk in the Forecast Division at 16*s.* a week with additional War Bonus of 7*s.* a week. To date from 2nd September, 1918.

Order 712 appointing **A. Woodley** Office Boy and Messenger at 14*s.* a week. To date from 6th August, 1918.

Order 708 appointing **R. G. Adamthwaite** Office Boy and Messenger at 14*s.* a week. To date from 21st June, 1918.

Order 715 appointing **A. E. Baker** Office Boy and Messenger at 16*s.* a week. To date from 12th August, 1918.

Order 716 appointing **V. E. Currell** Office Boy and Messenger, at 14*s.* a week. To date from 19th August, 1918.

Approved.

Recommended for Appointment.—**Miss G. F. Cocks**, B.Sc., Manchester, at a salary of £225.

Approved.

Recommended for Increase of Salary.—

Order 724 increasing the salary of **J. S. Dines**, M.A., by £40 per annum on promotion as Assistant Superintendent in the Forecast Division. To date from 1st August, 1918.

H. Fahmy from £2 10*s.* to £3 per week including War Bonus. To date from 29th July, 1918.

J. E. Belasco from £97 10*s.* to £125 per annum on his promotion from Clerk Assistant to Clerk on the M.O. Staff. To date from 1st September, 1918.

Approved.

Termination of Appointment.—**Miss G. C. Reid** on the completion of her engagement on 22nd August.

Resignation.—**Miss M. Robertson.**—Probationer in the Forecast Division. **J. L. Gray.**—Lieutenant in the King's Own Scottish Borderers, Probationer in the Marine Division.

Promotions.—Reported the following from the "London Gazette" :—

Major E. Gold, D.S.O., R.E., to be Lieut.-Colonel R.E. from 22nd March, 1918.

Lieut.-Colonel Lyons, R.E., to be Colonel from 7th May, 1918.

716. Observatories.—**Kew.**—Reported—that **C. D. Stewart,** Senior Professional Assistant, had been assigned for duty at Kew Observatory. To date from 1st August, 1918.

Eskdalemuir.—Reported—that **Miss V. Black** had been appointed temporary assistant at Eskdalemuir. To date from 22nd July.

Approved.

Valencia.—Reported—that **P. I. Mulholland,** B.Sc., Belfast, is recommended for appointment as Senior Professional Assistant at Valencia at a salary of £225 and a War Bonus of £34. To date from 19th August, 1918.

Approved.

Falmouth.—Recommended—that the name of **W. J. Fowler** be retained on the Office Staff and that his military pay be made up to civil pay during his absence on military service.

Approved.

Farnborough.—Reported—Order 718 appointing **Miss K. D. Walsh** as Clerk-Observer, on four weeks' probation, at a salary of 30*s.* a week. To date from 1st August, 1918.

Approved.

Aberdeen.—It was agreed to authorise Prof. C. Niven to appoint a boy clerk to assist Mr. G. A. Clarke in the work of the Observatory and to supplement the subvention for the observatory in Aberdeen to provide for the wages. It has been the practice for Prof. Niven to provide assistance in the observatory by assigning the duty to the students attending his laboratory, but in view of the additional requirements and the absence of students some more specific provision is necessary.

717. Publications.—**Manual of Meteorology** (Minute 710).—Submitted preliminary proofs of a portion of Part IV. which it is proposed to issue in advance of the rest of the book. It was agreed to approve of application being made to the Stationery Office for the use of blocks to illustrate the book which had been prepared for Office publications or for the contributions of the Office staff to the publications of the Advisory Committee for Aeronautics.

Observer's Handbook, 1918 edition.—Proof was laid on the table. It was agreed to order 50 additional copies for the Air Service.

Professional Notes No. 2.—Katabatic Winds, by E. V. Newnham.

No. 3.—Incidence of Fog in London, by C. E. P. Brooks.

Proofs were laid on the table.

718. Advisory Committee on Atmospheric Pollution.—Submitted—the following memorandum :—

ADVISORY COMMITTEE ON ATMOSPHERIC POLLUTION.

A letter has been received from the Department of Scientific and Industrial Research dated 29th June, 1918, in reply to the application of the Meteorological Committee (Minute 689) for a renewal of the grant. It informs the Committee of the decision to make a grant of £688, inclusive of the balance of the previous grant (amounting to £208 15*s.* 3*d.*) upon certain conditions set out in a Schedule.

Copies of the letter and Schedule are attached.

Some of the conditions laid down are new. In particular a condition that any report shall be communicated to the Committee of Council and their opinion taken as to publication, also a condition as to patents and the right of final decision as to interpretation which are now expressed as common form for grants from the department. There is also a special condition about inspection of the stations.

The letter and schedule have been referred for comment to the Advisory Committee which met on July 12th. Following copy minute has been received from the Secretary.

Extract of Minutes of Meeting held on July 12th, 1918, Advisory Committee on Atmospheric Pollution.

Each paragraph was read carefully and considered by the Committee, but only a few were considered to call for special remark. These were as follows :—

Paragraph 3, referring to the periodical inspection of stations ; it was suggested by Mr. Curphey that members of the Advisory Committee might arrange to inspect the gauges in their district and as

indicating the necessity for such inspection Mr. Curphey asked that his letter of March 18 last might be read at this stage. The Secretary read this letter, which referred to the faulty methods adopted at St. Helens and after full discussion of the question of inspection it was decided that Mr. Curphey's suggestion was the best solution of the difficulty. The following arrangement was then drafted.

Stations to be inspected.	*Members who undertook or might be asked to inspect.*
Coatbridge and Glasgow	Bailie Smith.
Manchester, Rochdale, St. Helens, Southport	Professor Gee.
Newcastle-on-Tyne	Mr. Curphey.
Malvern	Not settled, but Bailie Smith might inspect.
London	Dr. J. S. Owens.

Relative to Paragraph 10, which provided for communicating the results to the Research Council before publication :—It was decided that the tables of results which are published monthly in the "Lancet" should be submitted to the Reseach Council previously, but that the Secretary should get into touch with the Research Department relative to this as it might be considered unnecessary to submit the monthly tables. Relative to the Annual Report, the Secretary was instructed to submit this to the Research Department before publication.

Relative to Paragraph 11, dealing with patents :—The Committee, after discussing this, decided that they would not raise any objection to its insertion in the conditions but were sorry that such a condition should be made a part of the conditions.

Referring to the last paragraph of the covering letter of June 29 from the Department of Scientific and Industrial Research, which paragraph requested the Committee to nominate some one person who will be responsible for reporting the results of the research to the Committee of Council, it was decided to nominate the Secretary for this purpose.

The Secretary was instructed to send a copy of the Minutes of the meeting referring to the above conditions to the Director of the Meteorological Office.

Before the meeting, objection had been taken by letter to the Secretary by one of the members to the continuance of a naturalized alien (Bavarian) on the Committee, and on being informed of the receipt of a letter from the Home Office stating that "no facts are known to that department or the Military Authorities which would justify the withdrawal from this man of any of the rights and privileges of a British Subject" the protesting member resigned his place on the Committee.

The situation was considered by the Advisory Committee, who, on the assumption that the member who had resigned would withdraw his resignation if the name of the naturalized alien were omitted, passed the following resolution :—

> "The Advisory Committee on Atmospheric Pollution desire that Dr. Lessing's name be omitted from the Committee during the continuance of the war on account of the objections raised by members of the Advisory Committee, and that the Meteorological Committee be informed to this effect."

The Meteorological Committee have now to decide :—

(1) Whether they will accept the responsibility of the new grant on the terms laid down by the Department of Scientific and Industrial Research.

(2) Whether they will report to the Department that upon the request of the Advisory Committee on Atmospheric Pollution they have decided to omit the name of Dr. Lessing, and ask the Department to accept that arrangement.

The Advisory Committee at the same meeting requested permission for Sir Napier Shaw to be continued as Chairman of the Committee under the changed circumstances at the Office. The appointment hitherto has expressed that the Chairman of the Advisory Committee shall be the Director of the Office (*ex-officio*). If the wish of the Advisory Committee is to be carried out formal sauction is required for the Chairman of the Committee to undertake the chairmanship of the Advisory Committee.

These questions will be submitted to a meeting to be called shortly. It is expected that a meeting will be necessary in connexion with the Air Ministry.

Meteorological Office, S.W. 7.
12th August, 1918.

Department of Scientific and Industrial Research.

15, Great George Street,
Westminster, S.W. 1.,
29th June, 1918.

SIR,

I AM directed to inform you that the Committee of the Privy Council for Scientific and Industrial Research have decided, on the recommendation of their Advisory Council and upon the application of the Committee for the Investigation of Atmospheric Pollution, to make to the Meteorological Committee, for the expenses of the research into Atmospheric Pollution, a further grant of £685 to include the balance of the previous grant (amounting to £208 15*s.* 3*d.*) which was unexpended on 31st March, 1918.

This grant will be subject to the conditions set out on the enclosed Schedule. It will be observed h at these conditions are not substantially different from those attached to the previous grant as

enclosed in Sir Frank Heath's letter of 12th March, 1917 (144/17). Clauses 3, 7, and 12 are new, while clauses 10 and 11, which replace clause 8 of the conditions attaching to the previous grant are now, like clauses 6 and 12, common form conditions attached to all grants made by the Department. Clause 4 (which corresponds to clause 3 in the conditions attaching to the previous grant) has been slightly modified to meet the new circumstances of the grant for the current year.

I am to invite particular attention to the provisions of clause 3 which has been added on the recommendation of the Advisory Council.

With regard to clause 7 I am to state that the proposed payment of £100 to the Secretary for the current financial year is approved.

The grant will be paid to the Director, Meteorological Office, South Kensington, S.W. 7, in instalments as follows :—

£250 will be paid at soon as this Department has been informed of the acceptance of the conditions attached to the new grant. £150 will be paid on 1st October and the balance £76 4*s.* 9*d.* on 1st January, 1919, making with the unexpended balance of the previous grant a total of £685.

I am to request you to call the attention of the Advisory Committee to clauses 10 and 11 of the new conditions of grant, and to request them to be good enough at an early meeting to nominate some one person who will be responsible for reporting the results of the research to the Committee of the Council.

I am, &c.,
LL. S. LLOYD.

Sir Napier Shaw, D.Sc., LL.D., F.R.S.,
Meteorological Office,
South Kensington, S.W. 7.

COMMITTEE OF THE PRIVY COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH.

Conditions applying to the Grant in Aid of the Investigations into the Pollution of the Atmosphere.

1. The investigations will be directed by the Advisory Committee to the Committee of the Meteorological Office. The Advisory Council for Scientific and Industrial Research reserve the right to appoint a representative on the Directing Committee.

2. The Committee of the Meteorological Office will secure that the number of local centres in which investigation into the pollution of the atmosphere is carried on under the supervision of the Directing Committee shall not fall below the number of such centres existing on 1st January, 1917, and will be responsible for securing that the cost of the gauges used in these local centres and the analyses for local purposes of the results obtained will be borne by the Local Authorities interested.

3. The Advisory Committee will take suitable steps to secure that the arrangements for tests at the local stations are periodically inspected.

4. A further grant of £685, less the balance of the previous grant (amounting to £208 15*s.* 3*d.*) which was unexpended on 31st March, 1918, will be paid to the Committee of the Meteorological Office towards,

(*a*) the cost of maintaining a station in London as a control station under the immediate supervision of the Advisory Committee, and the cost of supervising, compiling, collating and discussing the results obtained at the local centres and the control station, and,

(*b*) the cost of the experimental investigation of methods of filtration of air with the object of securing a satisfactory means for recording the amount of impurity carried in the air,

(*c*) the cost of publication of the Report of the Committee for the Investigation of Atmospheric Pollution.

The Committee of the Meteorological Office will keep a separate account of the receipts and payments in respect of the work of the investigations.

5. Any plant, apparatus, instruments or other equipment provided for the purpose of the investigations by the Committee of the Meteorological Office will be entrusted to the Committee of the Meteorological Office ; but the Department of Scientific and Industrial Research reserves the right to determine, in consultation with the Advisory Committee and the co-operating bodies and persons, the ultimate disposal of such plant, apparatus, instruments and other equipment.

6. If it is proposed to charge to the cost of the Research any sum paid to any salaried official of a Public Educational Institution the facts should be submitted to the Committee of Council beforehand with information as to whether the proposal has received the approval of the Governing Body of the Institution.

7. If it is proposed to make to any member or officer of the Advisory Committee a payment of the nature of a salary, fee or honorarium, the facts should be submitted beforehand to the Committee of Council for approval.

8. Before they can agree to make further grants for annual periods from 1st April, 1919, the Committee of Council must be satisfied that the work is progressing satisfactorily and that all the conditions agreed upon are observed. Audited accounts for the period ending 31st March, 1919, together with a report on the progress of the investigations should be forwarded to the Department as soon as possible after the 31st March, 1919. Similar accounts and reports for subsequent annual periods will be required in the event of further grants being made. Each report should give particulars of any plant, apparatus, instruments or other equipment provided by the Committee of the Meteorological Office for the purposes of the investigations during the period covered by the report.

9. If the total expenditure on the investigations for any period is less than the estimated expenditure on which the grant has been calculated, the balance of grant will be returned to the Department or, if a contribution is made for a further period of work, may be carried forward as part of that contribution.

10. The results of the investigations as obtained from time to time shall in the first place be communicated to the Committee of Council who, after consultation with the bodies and persons who have co-operated in the conduct and maintenance of the Research shall determine, in the national interest whether and if so to what extent and under what conditions the results shall be made available.

11. The Committee of Council reserve the right to determine, after consultation with the bodies and persons who have co-operated in the conduct and maintenance of the research, whether, and if so to what extent and in what proportions, the Committee of Council and those bodies and persons shall secure to themselves by patent, designs or otherwise the ownership of the results of the Research and any benefits and profits arising therefrom.

12. If any question arises as to the interpretation of these conditions the decision of the Committee of Council shall be final.

APPENDIX.

Membership of the Advisory Committee.

Appointed by the Meteorological Committee.

- Sir Napier Shaw, F.R.S., Director of the Meteorological Office (*ex-officio*) (Chairman).
- Captain C. J. P. Cave (Past President of the Royal Meteorological Society).
- Mr. J. G. Clark.
- Professor J. B. Cohen, B.Sc., Ph.D., F.R.S. (Professor of Organic Chemistry, Leeds University).
- Dr. H. A. Des Voeux (Hon. Treasurer, Coal Smoke Abatement Society).
- Mr. J. B. C. Kershaw, F.I.C.
- Dr. R. Lessing, F.C.S.
- Dr. J. S. Owens (Coal Smoke Abatement Society).
- Dr. E. J. Russell (Director of the Rothamsted Experimental Station, Harpenden).
- Bailie W. Smith (Convener of the Air Purification Sub-Committee of the Glasgow Corporation).
- Mr. S. A. Vasey, F.I.C., F.C.S. (Director of the "Lancet" Laboratory).
- Mr. F. J. W. Whipple (Superintendent of the Statistical Division, Meteorological Office).

Appointed by the Municipal Authorities contributing observations.

- Dr. John Robertson, nominated by the Corporation of Birmingham.
- Dr. W. Hanna „ „ „ Liverpool.
- Dr. W. J. Howarth „ „ „ the City of London.
- Mr. Henry Mills, J.P. „ „ London County Council.
- Mr. W. Osborne Thorp „ „ Corporation of Malvern.
- Prof. W. Haldane Gee „ „ „ Manchester.
- Mr. C. T. Stableforth, J.P. „ „ „ Newcastle-on-Tyne.
- Dr. J. B. Wilkinson „ „ „ Oldham.
- Dr. J. R. Ashworth „ „ „ Rochdale.
- Dr. Cates „ „ „ St. Helens.
- Mr. John Fyfe „ „ „ Stirling.

Mr. W. S. Curphey (Chief Alkali Inspector of the Local Government Board). Appointed by the Advisory Council for Scientific and Industrial Research.

It was agreed to allow the proposal of the Advisory Committee to go forward and to approve the Chairman remaining Chairman of the Advisory Committee for the current year.

719. DIRECTOR'S REPORT AND ACCOUNTS :—

With reference to Minute 705 the War Office have agreed to pay 80 per cent. of any claim for instruments supplied on receiving notice of their dispatch to their destination.

The Director asked the approval of the Committee for his proceeding to France on 23rd August on inspection of the Meteorological Section R.E., and to discuss certain meteorological questions with the French and American Military Meteorological Services.

Reported—that with reference to Minute 711 the Office of Works had commandeered No. 15, Cromwell Road, of which the basement, ground floor, first and second floors would shortly be available for the Instruments Division.

Reported—that Climatological Memoranda on the regions of North West Russia, the Caspian Sea, and Eastern Siberia were in preparation in connection with the military operations.

Accounts.—Submitted—the following Statement of the Bank Account in the Cash Book :—

	£	*s.*	*d.*
Balance on 25th June, 1918	2,628	17	0
Receipts from 25th June to 20th August, 1918	12,799	10	10
	15,428	7	10
Cheques drawn from 25th June to 20th August, 1918	13,864	17	11
Bank balance on 20th August, 1918	£1,563	9	11

EIGHTY-EIGHTH MEETING.

South Kensington, S.W.7, 23rd October, 1918.

PRESENT :

SIR NAPIER SHAW IN THE CHAIR.

MR. BARSTOW.	COLONEL LYONS.
COLONEL GLENNIE.	SIR THOMAS MIDDLETON.
THE HYDROGRAPHER.	DR. SCHUSTER.

720. The revise of Minutes (704–711) of the Meeting of the 26th June, and the Minutes (712–719) of the Meeting of the 21st August, previously circulated were taken as read, and confirmed.

721. CORRESPONDENCE.—**South Farnborough Branch Office** (Minute 709).—Reported —that replies from the Army Council and the Air Ministry as to the maintenance of the Branch Office at South Farnborough had not yet been received.

722. BRITISH RAINFALL ORGANISATION (Minute 562).—Submitted—the following correspondence and memorandum :—

M.O. 13464. 6700/750.

6A, Dean's Yard,
Westminster, S.W.1,
28th September, 1918.

From the Development Commissioners to the Meteorological Office.

SIR,

I AM directed by the Development Commissioners to inform you that they have received an application from the British Rainfall Organisation for a grant of £1,500 in aid of the completion of a rainfall map of the United Kingdom. A copy of the application is enclosed, together with a report on it by the Board of Trade. The Commissioners desire me to ask you that you will be good enough to favour them with your observations on the application and also to inform them whether any consultations have taken place between the Meteorological Office and the British Rainfall Organisation regarding rain record arrangements, as suggested in my letter to you of 6th July, 1915.

I am, etc.,
R. T. WARNER,
Acting Secretary.

The Director,
Meteorological Office,
South Kensington, S.W.7.

M.O. 13464.

62, Camden Square,
London, N.W.1.
21st August, 1918.

From the British Rainfall Organisation to the Treasury.

SIR,

The importance of preparing a map of the average rainfall of the British Isles on as large a scale and in as great detail as the existing data permit has been accepted by the Sub-Committee of the Conjoint Board of Scientific Societies on the Water Power of the British Empire (Chairman Sir Dugald Clerk) and by the Board of Trade Committee on the Water Power of the United Kingdom (Chairman Sir John Snell) of both which Committees I am a member.

A map of the kind required can be compiled on the scale of 2 miles to one inch, the accuracy of the representation varying with the number of rainfall records available for each district, and as the number of observations increases, the map could be revised and improved. When completed such a Rainfall Map would be of equal value in estimating the amount of water available for water power, a water supply, the maintenance of canals, river conservancy, the regulation of fresh water fisheries, and also in Agriculture and Public Health.

Practically all the existing data for compiling such a map are in the possession of the Trustees of the British Rainfall Organisation and a large part of the work has already been carried out by me. The rainfall maps which I have prepared for the Board of Education (published on a small scale in the Water Supply Memoirs of the Geological Survey of England and Wales for thirteen Counties) were drawn on this scale and so were a large number of maps of gathering grounds which I have prepared for Water Bills in Parliament during the last eighteen years. The work already done covers 46 per cent. of the area of the British Isles.

I estimate that, if adequate assistance can be found the rainfall map of Great Britain could be completed in about eighteen months on the scale of 2 miles to 1 inch and that of Ireland in about six months on the scale of 4 miles to 1 inch at a total cost of about one thousand five hundred pounds (£1,500).

The Trustees of the British Rainfall Organisation authorise me to apply for a grant of £1,500 for this purpose subject to any condition which the Lords of the Treasury consider necessary.

I have reason to believe that this application will be supported by the Board of Trade.

I am, &c.,
HUGH ROBERT MILL,
Chairman of Trustee British Rainfall Organisation.

The Secretary,
H.M. Treasury.

M.O. 13464. 17th September, 1918.

REPORT BY THE BOARD OF TRADE, under SECTION IV (1) of the DEVELOPMENT AND ROAD IMPROVEMENT FUNDS ACT, 1909, on an application by the BRITISH RAINFALL ORGANISATION for an ADVANCE in aid of the COMPLETION of a RAINFALL MAP of the UNITED KINGDOM.

The statistics of rainfall in the United Kingdom have hitherto been collected almost exclusively by a voluntary organisation, though in most countries the task is performed by the official meteorological authority.*

So far, meteorological information has been obtained and circulated mainly in the interests of shipping and agriculture. Of late years, however, attention has been turned to the possibility of developing the use of water for power purposes in the United Kingdom, and a Committee was appointed jointly by the Board of Trade and the Ministry of Reconstruction, in June last, to "examine and report upon the Water Power resources of the United Kingdom and the extent to which they can be made available for industrial purposes."

Statistics of rainfall are evidently essential for the purpose of estimating the water power available in any district, and the map which the British Rainfall Organisation propose to prepare would be of great service, not only to the Committee, but to prospective users of water power, as indicating the districts in which useful powers are likely to be found. It would serve also as a basis for the more detailed and particular records which the development of aviation will no doubt render it necessary to keep in the near future.

The Board are not in a position to check Dr. Mill's estimate of the cost of preparing the proposed map, but it appears to them that the application of the British Rainfall Organisation is one which deserves the favourable consideration of the Development Commission.

M.O. 13473. Meteorological Office,
South Kensington, S.W.7.
30th September, 1918.

From the Meteorological Office to the Development Commission.

SIR,

I beg to acknowledge the receipt of your letter 6700/750 of the 28th inst. Consultations between this Office and the British Rainfall Organisation have been resumed during the last few weeks, and I anticipate being able to lay definite proposals before the Meteorological Committee which meets on the 23rd October, 1918 I anticipate that at that meeting the Committee will be able to communicate their views to you more definitely, both on the proposal to prepare a map of the average rainfall of the British Isles and on the general question referred to in your letter of the 6th July, 1915.

I am, &c.,
H. G. LYONS, Colonel,
Director.

The Secretary,
Development Commission,
6A, Dean's Street, Westminster, S.W.1.

6721/750. M.O. 14656.
6A, Dean's Yard,
Westminster, S.W.1.
21st October, 1918.

From the Development Commission in reply.

SIR,

WITH reference to your letter of the 30th ultimo (No. 13473) regarding the British Rainfall Organisation, I am directed by the Development Commissioners to say that they will be holding a Meeting at this Office on the 31st inst., when the application of the British Rainfall Organisation will come up for consideration. The Commissioners hope to have the views of the Meteorological Committee on the subject before them at that Meeting. If it is convenient for you to attend the meeting on the 31st inst., in order to explain the position personally, the Commissioners will be very glad if you would do so. In that case I should be glad to hear at what time between 11 and 1 it will suit you to come.

I am, &c.,
R. T. WARNER,
Acting Secretary.

The Director,
Meteorological Office,
South Kensington, S.W.7.

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* ". . . . as the work of the Office originated in the study of the meteorology of the sea exclusively, the detailed study of rainfall which is obviously a vital part of general meteorology and which is the fundamental study of practically all national meteorological establishments in the Dominions and in foreign countries, is still in this country, in accordance with tradition, left in charge of a private organisation, and also that the municipal authorities in this country make no provision as a general rule for recording their experiences of the weather for the guidance of their successors, thus all the information required for climatological questions to supplement what appears in the Daily Weather Report is left almost entirely to private effort."—Thirteenth Annual Report of the Meteorological Committee. Cd. 9143 (1918) p. 9.

MEMORANDUM BY THE ACTING DIRECTOR OF THE METEOROLOGICAL OFFICE.

BRITISH RAINFALL ORGANISATION.

At the meeting of the Meteorological Committee on the 26th January, 1916 (Minute 541) the Director of the Meteorological Office reported that, after some preliminary discussion with Dr. H. R. Mill, the Director of the British Rainfall Organisation, he had drafted a provisional statement of terms of an arrangement with the Organisation. This arrangement, with comments by Dr. H. R. Mill, and the Director, was laid before the Committee.

The Meteorological Committee discussed the arrangement but no action was taken, as Dr. Mill did not then contemplate any change, so long as he remained Director of the Organisation.

Since then, however, Dr. Mill has met with a serious accident, and although he has to a great extent recovered, his general health is affected, and he does not find himself able to carry on the work of the Organisation. He has therefore written to me privately, saying that he would be glad if the proposal to transfer the British Rainfall Organisation to the Meteorological Office could be further considered by the Committee, in order that, if an arrangement were reached, the transfer might take place at the end of the current year.

Dr. Mill has considerably modified several of his former proposals, and would, I think, now only ask that the work should be continued on the same scale as at present; that the staff of the Organisation should be taken over, that the Annual Report on the Rainfall of the British Isles should be maintained, and that an agreed sum should be paid for the records, documents, maps, instruments, etc. of the Organisation.

The arguments for the taking over of the Rainfall Organisation by the State have been set out fully in the Memoranda which were approved by the Meteorological Committee in April 1915 and January 1918, and were sent to the Development Commission and to the Ministry of Reconstruction respectively (Minutes 511 and 674).

I was informed by the Director of the Rainfall Organisation that the receipts from fees and payments for information supplied amounted annually to about £900. These receipts included fees for attending at Courts of Law as an expert witness on cases relating to Water Supply and kindred matters.

The present Staff of the Organisation consists of :—

Name.	Date of Joining.	Salary per Annum.	Allowance or Bonus	Total.
Salter, C.	1898.	300 0 0	170 15 0*	470 15 0
Carter, H. E	1907 †	130 0 0	25 0 0‡	155 0 0
Glasspoole, J.	1 year's service.	52 0 0§	8 0 0	60 0 0
Evans, Mrs.	Temporary.	78 0 0	3 0 0	81 0 0
Evans, C. F.	1916.	52 0 0	6 0 0‖	58 0 0
Oliver, J.	1918.	32 10 0	3 0 0¶	35 10 0
	Totals	£644 10 0	£215 15 0	£860 5 0

The Statement of Receipts and Expenditure for the year 1916 published in the Report of the British Rainfall Organisation for that year was as follows :—

RECEIPTS.

	£	s.	d.
Subscriptions	1,094	11	3
Sales to Public	60	15	1
Advertisements	55	8	2
Certificates	7	18	2
Supply Rainfall data	11	6	0
Maps, etc.	27	2	0
Interest on Endowment Fund and Bank Deficit	61	15	7
From Meteorological Office...	30	0	0
	£1,348	16	3

EXPENDITURE.

	£	s.	d.
Publication of *British Rainfall* and *Symon's Magazine*	468	5	8
Observers and Instruments	34	5	11
Salaries and Instruments	659	11	9
Printing, Stationery and Establishment Expenses	136	10	0
Extra Postage, Telephone, and Petty Expenses	70	2	11
Total ...	£1,368	16	3
Deficit met by Director	£20	0	0

* This includes £150 for fees, an amount which varies from year to year. £10 15*s.* for season ticket.
† Was in Meteorological Office from 1902 to 1907. Is now a Corporal in Meteorological Section R.E. and a prisoner of war.
‡ Overtime £20. Bonus £5.
§ Now a chemist on Government work and receiving £200. Holds B.Sc. degree.
‖ £3 overtime, £3 bonus. Aged 17 years.
¶ £3 bonus. Aged 15 years.

To this should be added the sum received for fees which on the average have amounted to about £900 per annum.

If the Organisation is taken over by the State there is likely to be a considerable reduction in the receipts since it is improbable that the Observers will pay to a State Institution the subscription which they paid to a private organisation. Also many of the fees received were paid for Dr. H. R. Mill's opinion as an expert on matters relating to rainfall, and would not necessarily come to the State Institution.

On the other hand Symons' Magazine would not be continued in its present form, though the notes for and from Observers would find their place in the Meteorological Circular of this Office, and in an Annual Report on the Rainfall of the British Isles.

The house, 62 Camden Square, is held by the Trustees of the Rainfall Organization on a lease which expires June 1944.

The Trustees held as an Endowment Fund in August 1917 :—

£2,151	11	3	North British Railway 3% Deb. Stock.
£123	5	0	New South Wales 3% Inscribed Stock.
£200	0	0	5% War Loan 1929—47.

The number of observers reporting their observations regularly to the Organisation is nearly 5200

The Organisation possesses the most complete collection of rainfall data which are recorded in about 200 loose-leaf volumes, and are stated to represent about 200,000 original records.

These records form the basis of all investigations as to the amount and distribution of rainfall over the British Isles and it is most important that they should be in safe custody and available for reference. Should they remain in private hands it is impossible to say whether at some future date they may be as carefully preserved as they have been hitherto.

This material is being constantly called upon for data required in all schemes for Water Supply ; and Dr. H. R. Mill was a member of the Commission on the Available Sources of Water Power in the Empire, as having this store of information in his possession, while the Meteorological Office was not represented.

The main point which will require consideration is the sum which should be paid to the Trustees of the British Rainfall Organisation for their Records, Maps, books, documents, instruments, etc.

After the death of Mr. G. J. Symons the Organisation was left in the direction of two Co-Directors, one of them being Dr. H. R. Mill, and very shortly afterwards Dr. Mill bought out his Co-Director paying a sum of about £3,200 for his share in the Organisation at that date.

Since that date the Organization has increased greatly in its membership, in the efficiency of its work, and in its collection of original records which must have been almost doubled.

H. G. LYONS,
Director.

11th October, 1918.

It was agreed to report to the Treasury in favour of taking over the work of the British Rainfall Organisation without delay and to ask that the Organisation should give facilities for a valuer to report upon the financial position in order that a sum may be arrived at which can be put before the Treasury as the price at which the Organisation would be transferred to the State as a going concern.

The Director was requested to inform the Development Commission of this resolution.

M.O. 14758.

Meteorological Office,
South Kensington, S.W.,
24th October, 1918.

SIR,

WITH reference to your letter 6721/750 of the 21st instant, I have to inform you that the Meteorological Committee had before them yesterday a proposal from Dr. H. R. Mill on behalf of the British Rainfall Organisation that the Meteorological Committee as the State Meteorological Service should take over the work, Records, documents, &c., of the Organisation. The Committee were wholly in favour of adopting the proposal and are asking for some additional information before forwarding their recommendation to the Lords Commissioners of H.M. Treasury.

The Meteorological Committee would therefore suggest that it would not be expedient to take any action which would have the effect of making a grant to the Organisation when the general question of its transfer, and compensation to be paid for such transfer, were on the point of being considered.

I shall be glad to attend the Meeting on the 31st instant if it is still considered desirable. Any time between 11 a.m. and 1 p.m. would be quite convenient.

I am, &c.,
Your obedient servant,
H. G. LYONS, Colonel,
Director.

The Secretary,
Development Commission,
6a, Dean's Yard,
Westminster, S.W. 1.

723. OFFICE STAFF.—Authority was given for the following appointments :—

Miss E. E. Austin (Minute 708) to be graded as Senior Professional Assistant as from 23rd October, 1918, with a salary of £225 per annum and War Bonus in confirmation of the appointment as from 8th July, 1918, as Secretary to the Adviser. The appointment to be terminable by three months' notice on either side (Order 762).

Miss V. Simon, Probationer, at 22*s.* per week in addition to War Bonus (Orders 733 and 757).

Miss M. Coysh, Probationer, at 22*s.* per week in addition to War Bonus (Orders 734 and 758).

Miss A. L. Sanford promoted to Clerk Computer at £75 per annum in addition to War Bonus to date from 28th October, 1918 (Order 759).

Reported—that **F. W. Beaver**, assistant in the Forecast Division (Minute 630), **W. E. King**, temporary Boy Clerk (Minute 667), and **C. E. Goad**, Office Keeper (Minute 708), had left the Office for Military Service.—Also that Corporal **C. V. Ockenden**, R.E. (Instruments Division), now promoted Sergeant, had been mentioned in despatches by Lieut.-General G. F. Milne for service at Salonika.

Reported also—that 2nd A.M., C. C. Newman, Probationer in the Forecast Division, had received a commission as 2nd Lieutenant in the Meteorological Service, R.A.F.

War Bonus.—In accordance with Awards Nos. 51, 52, and 56 of the Conciliation and Arbitration Board for Government employees it was agreed subject to Treasury sanction, if necessary, to allow war bonus to employees on the Office Staff at the following rates in lieu of the rates authorised by Minute 675 :—

——	Men.	Women.
Remuneration not exceeding 60*s.* per week :—		
Employees of 21 years of age and upwards	19*s.*	12*s.* 6*d.*
„ under 21 but not under 18 years of age...	15*s.*	12*s.* 6*d.*
„ under 18 years of age	9*s.* 6*d.*	9*s.* 6*d.*
Remuneration exceeding £156 10*s.* but not exceeding £230.	£50 per annum	£33 per annum
Remuneration exceeding £230 but not exceeding £233 6*s.* 8*d.*	£50 per annum	10 per cent. of salary and £10 per annum.
Remuneration exceeding £233 6*s.* 8*d.* but not exceeding £250.	15 per cent. of salary and £15 per annum.	10 per cent. of salary and £10 per annum.
Remuneration exceeding £250 but not exceeding £312 10*s.*	£52 10*s.* per annum	£35 per annum
Remuneration exceeding £312 10*s.* but not exceeding £350.	12 per cent. of salary and £15 per annum.	8 per cent. of salary and £10 per annum.
Remuneration exceeding £350 but not exceeding £420	£57 per annum	£38 per annum
„ „ £420 „ „ £500	10 per cent. of salary and £15 per annum.	6·6 per cent. of salary and £10 per annum.

	Men.	
Remuneration exceeding £500 but not exceeding £650	£65 per annum	Payable in two instalments, on 30th June and 31st December.
„ „ £650 „ „ £800	10 per cent. of salary	
„ „ £800 „ „ £1,000	£80 per annum	

The Award to be subject to the same provisions as the previous Award, except that (3) shall now read :—Persons who have been engaged as part-time employees engaged on manual duties may be allowed such proportion of the war bonus payable to full-time employees as their ordinary hours of work bear to full time employment. Cleaners should be allowed one-half of the war bonus.

Boy Assistants.—The appointment of Boy Assistants for mechanical and technical work on the same terms of employment as Boy Clerks for clerical work was approved.

724. Observatories.—**Eskdalemuir.**—Reported—that Professor W. Peddie, of Dundee, had completed his term of voluntary service at Eskdalemuir during Dr. Crichton Mitchell's absence on leave.

It was agreed that the thanks of the Committee be given to Professor Peddie for his assistance.

Read—a memorandum (C.E. 80) on the Measurement of Pulsations and Rapid Changes in the Vertical Component of the Earth's Magnetic Field, proposed to be carried

out at Eskdalemuir with the concurrence of Professor Bragg of the Admiralty. The investigation was approved and the supply of the necessary instruments authorised.

South Farnborough.—*Patent Application No.* 15464/17—*Watt.*—Reported—that the Munitions Inventions Department of the Ministry of Munitions had thought it desirable for the publication of the specification of Mr. Watt's patent (Minute 663) to be suspended during the war and arrangements had therefore been made for an order of prohibition to be issued by the Patent Office against this application. (M.O. 13,895.)

Reported—that **Miss K. D. Walsh** (Minute 716) had been confirmed in her appointment at South Farnborough at 30*s.* per week, to date from 1st September (Order 760) and had subsequently resigned as from 26th October, 1918.

Aberdeen.—Reported—an application from Professor Niven for a War Bonus for Mr. G. A. Clarke. It was agreed that the payment of a War Bonus to Mr. Clarke be approved and that the grant for Aberdeen Observatory be increased by the amount necessary to provide a War Bonus corresponding with that of the Office Staff.

725. Telegraphic Reporting Stations.—Reported—that several requests had been received from Telegraphic Reporting Stations asking for increased remuneration in consideration of the increased cost of living. It was agreed to increase the retaining fee by one-third in the cases of those observers at 1 h. to whom no previous increment had been given and to make up the increase in the other cases to the same figure.

726. Publications.—M.O. 234. **Manual of Meteorology** (Minute 717).—Reported—that in connection with an application to the Stationery Office for electros of blocks for the illustration of Part IV. of the Manual of Meteorology now in the press, the question of the price to be charged for official copies was raised by the Controller of the Stationery Office; and the following letter had been addressed by the Cambridge University Press to the Stationery Office :—

M. O. 13,410

Sir, 25th September, 1918.

Sir Napier Shaw has asked me to give you certain information with regard to his proposed book of Meteorology. According to our present estimates, the book will be issued to the public at 21*s.* net per copy, and it is proposed that 1,000 copies should be supplied to the Stationery Office or the Meteorological Office for official use at that price less the usual trade allowances, and, also, less a further sum of 1*s.* 8*d.* per copy in consideration of : (1) no charges being included in respect to these copies for author's royalties, and (2) the facilities given by the Stationery Office and the Meteorological Office for the use of books and for official matter. These allowances will bring the price for the official copies to 15*s.* net. In view of the further recent rise in binding prices, we have included for binding the sum of 2*s.* 6*d.* per copy.

In accordance with your suggestion, we are proposing to make as soon as possible a confidential issue, not exceeding 250 copies, of Part IV of the Manual, which includes special matter relating to Winds on which information is very much required by the Services. This issue we propose to make at the cost of paper, working and stitching, the cost of composition being charged against the complete book.

I enclose a cheque for 7*s.*, your charge for the use of blocks for which Sir Napier Shaw has made application.

I am, &c.,
J. B. Peace.

The Controller,
H.M. Stationery Office,
Westminster, London, S.W. 1.

In connection therewith a letter had been received from H.M. Stationery Office (M.O. 13,785) pointing out that for 1,000 copies the Stationery Office were accustomed to claim larger discounts than those proposed by the Press. A draft-letter, setting out the reasons for considering that the adjustment of the price to allow of discounts at the rate suggested by the Stationery Office would necessitate an increase of the sale price to the public without any reduction of the actual net price of the official copies, was approved.

The proof of Part IV.—the Relation of Wind to the Distribution of Barometric Pressure—of the Manual was laid on the table.

M.O. 230. **The Weather of the British Coasts.**—Reported—that copies had been received in limp cloth binding.

Reported—that, M.O. 232b, **Professional Notes No. 2,** "Note on examples of katabatic wind in the valley of the Upper Thames at the Aerological Observatory of the

Meteorological Office at Benson," by E. V. Newnham, and M.O. 232c, **Professional Notes No. 3**, " Incidence of Fog in London on 31st January, 1918," by C. E. P. Brooks, had been issued.

M.O. 191. **Observer's Handbook.**—Proof of the edition for 1918 was laid on the table.

The publication of the collection of correlation coefficients affecting meteorological relationships made by Captain Chapman at Mr. W. H. Dines's suggestion was authorised ; also the publication of a collection of photographs of Cloud-Forms from aeroplanes by Captain C. K. M. Douglas was authorised when suitable text to accompany the pictures had been prepared.

727. DIRECTOR'S REPORT AND ACCOUNTS :—

	£
On the 30th September, 1918, the value of the instruments, &c. in the Store was ...	7,730
The value of instruments, &c. ordered but not received was	26,377
The total of claims against various departments, &c. made but not paid was	3,484

The Instruments Division is now established at No. 15, Cromwell Road, and the increased accommodation has greatly facilitated the examination and supply of instruments.

The repair of damaged instruments has become increasingly difficult to arrange since firms can do little more than meet the demands for new instruments. An arrangement has therefore been made with the Director of the Science Museum whereby the Museum workshop shall assist in such work as their facilities permit. This arrangement came into force on September 25th, 1918.

In accordance with the recommendations of an Admiralty Committee, the issue of Daily, Weekly and Monthly Weather Reports has been restricted to Government Departments and Offices making use of them in connection with the prosecution of the war. The necessity for this measure was explained to observers and correspondents of the Meteorological Office who have in almost every case expressed their willingness to continue their observations.

During the Director's recent visit to France the arrangements for supplying meteorological information to the British, French and American Military Meteorological Services were examined and discussed. Many modifications were made in order to reduce the delays which occurred, and to unify the procedure in observing and reporting so far as possible. The use by the American Military Service of the French units (millimetres, degree Centigrade, and grades) introduces certain difficulties in the extension of such unification at present.

In France the Military and Naval Meteorological Services have practically replaced the Bureau Central Météorologique for the period of the war.

Climatological summaries of the regions of North-West Russia and the Caspian Basin have been prepared and supplied to the Admiralty, War Office and Air Ministry.

The construction of the New Science Museum on the south side of the Meteorological Office has reached a point at which this building interferes with some of the instruments on the roof of the Meteorological Office. The records obtained by the anemograph and sunshine recorder are no longer worth preserving.

The Secondary Forecasting Station which has been at Stonehenge with the Meteorological Section R.E. (Home) is about to be transferred to Salisbury in order that weather reports may be received and issued more rapidly than is possible at the end of a branch telephone line.

Accounts.—It was agreed that the draft estimates for 1919–20 be duplicated and circulated.

Submitted—The following statement of the Bank Account in the Cash Book :—

	£	s.	d.
Balance on 20th August, 1918	1,563	9	11
Receipts from 20th August to 22nd October, 1918	14,599	3	4
	16,162	13	3
Cheques drawn from 20th August to 22nd October, 1918	11,285	16	11
Balance on 22nd October, 1918	£4,876	16	4

Submitted—The following Statement of Accounts for the three months ended 30th June, 1918, prepared for audit by the Comptroller and Auditor-General:—

RECEIPTS.						PAYMENTS.					
1917.				1918.		1917.				1918.	
£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.	
2,047 13 5	Balance from year 1917–18	—		99 14 10		250 0 0	Advisor	—		250 0 0	
						—	Director...	—		26 17 6	
5,625 0 0	Parliamentary vote..	—		5,625 0 0			OFFICE SALARIES (including Insurance):				
—	Vote of Credit, on Account	—		3,750 0 0		2,601 6 10	Monthly	3,240 2 7			
						446 5 3	Weekly	690 14 1			
	DEPARTMENTAL EXPENSES REPAID:									3,930 16 8	
11 0	Forecasts, &c. ...	2 10 6				172 6 5	EXPENSES OF OFFICE: Rent, Heating, and Lighting	173 13 4			
16 7 8	Marine, Statistical, and Administrative	28 1 4				11 3 0	Furniture and Equipment	17 10 9			
29 19 10	Instruments ...	227 7 11				9 17 10	Library	3 9 4			
				257 19 9		3 3 9	Insurances and Repairs	3 3 9			
	INCIDENTAL EXPENSES REPAID:					34 5 5	Incidental Expenses, and Consumable Stores	71 0 10			
18 6 3	D.W. Report ...	73 19 5									
14 1 6	Divisional... ...	38 2 1				—	Advertising Account ...	1 17 6			
2 0 10	Advertising Account	3 14 7								270 15 6	
				115 16 1			POST OFFICE:				
						177 3 6	Postage	233 2 0			
						96 0 7	Telephones	140 18 2			
24 14 11	STATIONERY OFFICE	—		25 19 0		1,037 15 9	Telegrams	927 8 7			
219 0 11	TELEGRAPH CHARGES REPAID	—		117 12 0						1,301 8 9	
						64 1 4	STATIONERY OFFICE ..	—		—	
0 5 3	TELEPHONE CHARGES REPAID	—		53 14 6		2 2 0	TRAVELLING EXPENSES	—		22 3 11	
							SUPERANNUATION:				
6 9 6	INSPECTIONS ...	—		—		6 5 0	Pensions not chargeable on Fund ...	6 5 0			
	INSTRUMENTS:					68 18 0	Pensions chargeable on Fund	33 0 6			
—	Royal Navy ...	—		—							
900 12 3	By sales from Stock	—		4,444 5 4		140 12 6	Annuities	133 2 6			
						—	Contribution to fund	—			
	SUPERANNUATION ACCOUNT:									172 8 0	
						1,052 19 8	COST OF INSTRUMENTS: Royal Navy	623 16 0			
140 12 6	Annuities	140 12 6									
21 1 1	Interest on Investments	24 18 0				1,520 9 0	For Stock	4,834 7 11			
				165 10 6						5,458 3 11	
	*OBSERVATORIES, BRANCHES, AND STATIONS:						*OBSERVATORIES, BRANCHES, AND STATIONS:				
57 7 9	Richmond... ...	154 19 3				578 16 11	Richmond	616 19 6			
504 14 6	Eskdalemuir ...	501 15 5				325 14 7	Eskdalemuir	465 5 4			
8 6 6	Cahirciveen ...	6 9 0				180 7 9	Cahirciveen	208 7 0			
266 8 3	Farnborough ...	—				72 1 5	Farnborough... ...	225 8 1			
3 10 10	Falmouth... ...	1 2 4				72 15 5	Falmouth	120 18 9			
—	Benson	—				140 17 5	Benson	137 15 3			
—	Edinburgh ...	—				102 2 3	Edinburgh	117 17 3			
500 0 0	Committee for Atmospheric Pollution	—				25 0 0	Investigation of Atmospheric Pollution	154 15 11			
						299 0 1	Miscellaneous ...	478 11 0			
43 2 6	Miscellaneous ...	61 10 10								2,525 18 1	
				725 16 10		9,491 11 8	Balance due to Bank on April 1st, 1918...	—		1,221 12 1	
10,450 7 3										15,180 4 5	
—	National War Bonds	—		3 0 0		97 4 0	*Less* National War Loan Subscription..	—			
97 16 0	*Less* War Loan Subscription	—		—		9,394 7 8					
							BALANCE:				
						885 11 9	Cash at Bank... ...	103 2 7			
						72 11 10	,, at Office ...	101 1 10			
										204 4 5	
£10,352 11 3				£15,384 8 10		£10,352 11 3				£15,384 8 10	

* For details, *see* separate statement.

Statement of Assets and Liabilities at 30th June, 1918.

LIABILITIES.				ASSETS.			
£ s. d.		£ s. d.		£ s. d.		£ s. d.	
4,305 18 11	To sundry creditors	8,623 5 3		958 3 7	By cash at Bank and at Office ...	204 4 5	
				23 18 2	,, salaries reserved (premiums) ...	23 18 2	
120 18 6	,, superannuation	726 8 6		1,104 2 11	,, Instruments in stock	4,717 12 4	
				2,404 17 11	,, sundry debtors	1,837 11 5	
2,245 17 7	,, balance	562 4 8		2,181 12 5	,, Admiralty	3,128 12 1	
£6,672 15 0		9,911 18 5		£6,672 15 0		9,911 18 5	

NOTE.—On 30th June the amount of Government securities held for the provision of Superannuation Annuities was £26 14*s.* 2*d.* 2½ per cent. Consols, and £989 9*s.* 6*d.* 5 per cent. War Loan.

Observatories.—Statement of Accounts for the three months ended 30th June, 1918.

Richmond.

1917.	Receipts.	£ s. d.	£ s. d.	1918.
£ s. d.				
41 0 0	Subvention, Scott Antarctic Fund	—		
—	Gassiot Trust	110 2 2		
			110 2 2	
2 16 0	Expenses refunded locally ...		31 13 4	
—	Tests and Commissions		—	
13 11 9	Cost of books and forms refunded		13 3 9	
521 9 2	Balance		462 0 3	
£578 16 11			£616 19 6	

1917.	Payments.	£ s. d.	£ s. d.	1918.
£ s. d.				
456 16 10	Salaries, Scheduled...	509 17 5		
20 12 6	Sunday and holiday duty	8 8 0		
			518 5 5	
9 18 6	Cost of forms, &c.		—	
12 16 6	Rent, Rates, Taxes, Repairs and Insurance		3 10 9	
28 17 8	Fuel and lighting		31 15 3	
6 14 2	Equipment and instruments ...		4 19 9	
8 10 8	Consumable stores		20 19 0	
6 12 9	Incidental expenses		2 15 8	
2 14 0	Books, &c.		2 5 6	
25 3 4	Postage, telephones and telegrams		31 19 4	
—	Travelling expenses		8 10	
£578 16 11			£616 19 6	

Eskdalemuir.

£ s. d.		£ s. d.	£ s. d.	£ s. d.
500 0 0	Subvention, Royal Society ...	500 0 0	239 4 8	Salaries, Scheduled ... 327 3 0
4 14 6	Expenses refunded locally ...	1 15 5	22 1 5	Cost of forms, &c. 10 3
—	Balance	—	13 0 7	Rent, Rates, Taxes, Repairs and Insurance 2 5 3
			2 10 0	Fuel and lighting 57 7 3
			—	Equipment and instruments ... 1 5 0
			7 5 2	Consumable stores... ... ... 4 2 11
			1 11 9	Incidental expenses 2 5
			2 12 0	Books, &c. 11 1 10
			28 18 5	Postage, telephones and telegrams 25 18 10
			8 10 7	Travelling and motor car expenses 35 8 7
			178 19 11	Balance 36 10 1
£504 14 6		£501 15 5	£504 14 6	£501 15 5

Cahirciveen.

£ s. d.		£ s. d.	£ s. d.	£ s. d.
—	Subventions (Rosse Fund) ...	—	131 5 0	Salaries, Scheduled 170 12 3
8 6 6	Expenses refunded locally ...	6 9 0	—	Cost of forms ... ... —
172 1 3	Balance	201 18 0	20 1 6	Rent, Rates, Taxes, Repairs and Insurance 5 10 0
			6 17 0	Fuel and lighting 3 12 0
			3 7 10	Equipment and instruments ... 11 9
			2 6 11	Consumable stores 1 17 7
			1 10 2	Incidental expenses 3 9 1
			1 8 0	Books, &c. 2 15 11
			13 11 4	Postage, telephones and telegrams 19 18 5
			—	Travelling expenses ... ... —
£180 7 9		£208 7 0	£180 7 9	£208 7 0

Farnborough Branch Office.

£ s. d.		£ s. d.	£ s. d.	£ s. d.
250 0 0	Subvention (Advisory Committee for Aeronautics)	—	24 18 3	Salaries, Scheduled 185 6 6
16 8 3	Expenses refunded (War Office) ...	—	—	Overtime, &c. 4 2 6
—	Balance	225 8 1		189 9 0
			—	Cost of Forms ... ... —
			6 4	Rent, Rates, Taxes, Repairs and Insurance 6 4
			—	Fuel and lighting ... ... —
			16 9 5	Equipment and instruments ... —
			3 16 4	Consumable stores ... ... —
			—	Incidental expenses 16 3 2
			1 8 0	Books, &c. 2 5 6
			14 6 8	Postage, telephones and telegrams 17 4 1
			10 16 5	Travelling and motor car expenses —
			194 6 10	Balance ... ... —
£266 8 3		£225 8 1	£266 8 3	£225 8 1

Falmouth Weather Station.

£ s. d.		£ s. d.	£ s. d.	£ s. d.
3 10 10	Expenses refunded locally ...	1 2 4	15 0 0	R. Cornwall Polytechnic Society... 15 0 0
69 4 7	Balance	119 16 5	44 0 3	Salaries, Scheduled 79 3 11
			—	Rent, Rates, Taxes, Repairs and Insurance ... ... —
			—	Equipment and instruments ... —
			—	Consumable stores 1 9
			—	Incidental expenses ... ... —
			13 1	Books... ... ... 17 6
			12 19 1	Postage, telephones and telegrams 23 13 8
			3 0	Travelling expenses 2 1 11
£72 15 5		£120 18 9	£72 15 5	£120 18 9

BENSON.

1917.	Receipts.		1918.	1917.	Payments.		1918.
£ s. d.			£ s. d.	£ s. d.			£ s. d.
—	Expenses refunded locally	...	—	106 2 0	Salaries, Scheduled...	... ...	112 12 6
140 17 5	Balance	...	137 15 3	1 13 6	Overtime, &c.	... ...	—
				—	Cost of forms, &c.	... ...	—
				—	Rent, Rates, Taxes, Repairs and Insurance ...	... ...	—
				3 5 0	Fuel and lighting	... ...	10 0
				—	Equipment and instruments	...	1 10 0
				6 16 11	Consumable stores ...	... ...	5 8 11
				1 5 4	Incidental expenses	... ...	10 0
				10 6	Books, &c. ...	... ...	17 6
				21 4 2	Postage, telephones and telegrams		15 12 9
				—	Travelling expenses	... ...	13 7
£140 17 5			£137 15 3	£140 17 5			£137 15 3

METEOROLOGICAL OFFICE, EDINBURGH.

£ s. d.			£ s. d.	£ s. d.			£ s. d.
102 2 3	Balance	...	117 17 3	87 10 0	Subvention ...	... ...	102 10 0
				14 12 3	Travelling expenses	... ...	15 7 3
£102 2 3			£117 17 3	£102 2 3			£117 17 3

ADV. COM. ATMOS. POLLUTION.

£ s. d.			£ s. d.	£ s. d.			£ s. d.
500 0 0	Subvention	...	—	25 0 0	Salaries scheduled ...	... ...	25 0 0
—	Balance	...	154 15 11	—	Overtime, &c.	... ...	9 19 2
				—	Equipment and instruments	...	9 1
				—	Consumable stores ...	... ...	1 11 6
				—	Incidental expenses (including printing of report for 1916–17)		114 2 8
				—	Books, &c. ...	... ...	3 13 6
				—	Postage, telephones and telegrams		—
				475 0 0	Balance ...	... ...	—
£500 0 0			£154 15 11	£500 0 0			£154 15 11

MISCELLANEOUS STATIONS.

£ s. d.			£ s. d.	£ s. d.			£ s. d.
—	Expenses refunded locally	...	6 15 0	86 2 6	Subventions: Aberdeen, Armagh		86 2 6
43 2 6	Cost of forms refunded	... ...	54 15 10	—	„ British Rainfall Organisation ...		—
255 17 7	Balance	...	417 0 2	164 3 0	Salaries of Observers (38) ...	...	213 9 3
				—	Overtime ...	... ...	—
				27 7 6	Cost of forms, &c. ...	... ...	154 15 0
				1 13 5	Rent, Rates, Taxes, Repairs and Insurance ...	... ...	2 12 5
				1 0 9	Fuel and lighting ...	... ...	—
				—	Equipment and instruments	...	4 2 6
				—	Consumable stores ...	... ...	—
				2 15 4	Incidental expenses, &c.	... ...	15 0
				5 7	Books, &c. ...	... ...	17 6
				15 12 0	Postage, telephones and telegrams		15 16 10
£299 0 1			£478 11 0	£299 0 1			£478 11 0

METEOROLOGICAL FIELD SERVICE.

FRANCE.

£ s. d.			£ s. d.	£ s. d.		£ s. d.	£ s. d.
137 5 10	War Office	...	1,480 1 3	12 10 0	Salaries: Major E. Gold ...	26 11 4	
345 5 10	Balance	...	—	—	Capt. A. H. R. Goldie ...	—	
				—	Lieut. E. H. Chapman ...	—	
				—	Lieut. C. D. Stewart ...	—	
				11 4 5	Sergt. R. Pyser ...	1 9 0	
				8 9 0	Corpl. E. L. Clinch ...	2 9 6	
				17 13 10	Corpl. A. G. Goad ...	12 3 10	
				8 13 8	Corpl. C. F. J. Jestico ...	2 9 6	
				8 9 0	Corpl. R. M. Poulter ...	—	
							45 3 2
				6 19 1	Incidental Expenses: Postage ...	6 7 5	6 7 5
				—	Telegrams ...	—	
				—	Printed books	—	
				—	Miscellaneous...	—	
				408 12 8	Instruments	...	774 8 2
				—	Balance	...	654 2 6
£482 11 8			£1,480 1 3	£482 11 8			£1,480 1 3

DARDANELLES.

£ s. d.			£ s. d.	£ s. d.		£ s. d.	£ s. d.
211 16 8	Admiralty	...	—	7 9 6	Salaries: Corpl. C. V. Ockenden	2 9 6	
81 7 9	War Office	...	262 11 4				2 9 6
352 3 3	Balance	...	164 1 2		Incidental Expenses:		
				6 10 0	Postage	2 5 2	
				556 13 1	Telegrams	202 6 9	
				—	Printed books ...	—	
				—	Miscellaneous ...	—	
							204 11 11
				74 15 1	Instruments	... ...	219 11 1
				—	Balance	... ...	—
£645 7 8			£426 12 6	£645 7 8			£426 12 6

Submitted—The following Statement of Accounts for the six months ended 30th September, 1918, prepared for audit by the Comptroller and Auditor-General :—

Receipts.

1917. £ s. d.		£ s. d.	1918. £ s. d.
2,047 13 5	Balance from year 1917-18	—	99 14 10
11,250 0 0	Parliamentary vote.	—	11,250 0 0
—	Vote of Credit ...	—	5,500 0 0
	DEPARTMENTAL EXPENSES REPAID :		
1 4 6	Forecasts, &c. ...	4 19 6	
32 19 8	Marine, Statistical, and Administrative	49 14 3	
152 15 9	Instruments ...	690 9 4	
			745 3 1
	INCIDENTAL EXPENSES REPAID :		
32 6 1	D.W. Report ...	81 18 7	
35 18 7	Divisional... ...	99 2 2	
4 8 1	Advertising Account	6 4 8	
			187 5 5
41 13 3	STATIONERY OFFICE	—	48 10 1
1,608 12 5	TELEGRAPH CHARGES REPAID	—	124 9 7
1 6 3	TELEPHONE CHARGES REPAID	—	85 10 10
94 9 6	INSPECTIONS ...	—	—
	INSTRUMENTS :		
1,985 15 4	Royal Navy ...	605 15 10	
2,314 5 2	Mercantile Marine, Stations, &c. ...	13,556 10 9	
			14,162 6 7
	SUPERANNUATION ACCOUNT :		
281 5 0	Annuities... ...	273 15 0	
21 4 5	Interest on Investments	25 1 4	
			298 16 4
	*OBSERVATORIES, BRANCHES, AND STATIONS :		
331 19 6	Richmond ...	196 13 9	
510 15 3	Eskdalemuir ...	506 18 8	
9 6 6	Cahirciveen ...	7 9 0	
266 8 3	Farnborough ...	—	
8 6 11	Falmouth... ...	8 17 4	
—	Benson	—	
—	Edinburgh ...	—	
500 0 0	Atmos. Pollution...	250 0 0	
63 0 11	Miscellaneous ...	85 7 11	
			1,055 6 8
—	Nat. War Bonds ...	—	3 0 0
—	To Balance... ...	—	—
21,595 14 9			
97 16 0	Less War Loan Subscriptions included in balance on 1st April, 1917 ...	—	—
3 16 0	*Add* unexpended subscription (Poulter)	—	—
£21,501 14 9			£33,560 3 5

Payments.

1917. £ s. d.		£ s. d.	1918. £ s. d.
—	Adviser	—	500 0 0
500 0 0	Director	—	67 3 9
	OFFICE SALARIES (including Insurance) :		
5,629 2 7	Monthly	6,664 12 7	
1,020 14 10	Weekly	1,465 6 10	
			8,129 19 5
	EXPENSES OF OFFICE :		
345 0 0	Rent, Heating, and Lighting	349 11 11	
28 6 3	Furniture and Equipment	24 10 3	
12 19 9	Library	3 9 4	
3 3 9	Insurances, Repairs...	41 5 4	
69 3 11	Incidental Expenses and Consumable Stores	240 7 7	
3 15 0	Advertising Account...	3 15 0	
			662 19 5
	POST OFFICE :		
388 7 9	Postage	619 16 7	
99 1 7	Telephones	189 1 0	
2,018 15 10	Telegrams	1,755 18 7	
			2,564 16 2
64 1 4	STATIONERY OFFICE...		96 0 8
82 10 1	TRAVELLING EXPENSES		172 2 5
	SUPERANNUATION :		
12 10 0	Pensions not chargeable on Fund ...	12 10 0	
137 16 0	Pensions chargeable on Fund	66 1 0	
281 5 0	Annuities	266 5 0	
—	Contribution to fund.	—	
			344 16 0
	COST OF INSTRUMENTS:		
1,992 16 4	Royal Navy	623 16 0	
3,290 13 3	For Stock	13,285 8 0	
			13,909 4 0
	*OBSERVATORIES, BRANCHES, AND STATIONS :		
1,146 9 9	Richmond	1,220 12 7	
736 2 0	Eskdalemuir	1,013 19 11	
354 2 2	Cahirciveen	460 18 3	
231 1 8	Farnborough ...	424 3 1	
180 5 2	Falmouth	287 15 8	
313 11 1	Benson	280 17 6	
189 12 3	Edinburgh	220 7 3	
69 16 5	Atmos. Pollution ...	169 6 11	
597 15 2	Miscellaneous ...	906 5 1	
			4,984 6 3
19,828 18 11			
97 0 0	†LESS WAR LOAN SUBSCRIPTIONS ...	—	—
19,731 18 11			
	Balance on April 1st, 1918	—	1,221 12 1
	BALANCE IN HAND :		
1,680 6 11	Cash at Bank ...	784 15 8	
89 8 11	,, at Office ...	122 7 7	
			907 3 3
£21,501 14 9			£33,560 3 5

* For details, see separate statement. † Deductions from Salaries during September; lodged with Bank on October 5th.

Statement of Assets and Liabilities at 30th September, 1918.

Liabilities.

£ s. d.		£ s. d.
—	To Admiralty	1,152 13 4
3,734 1 5	,, sundry creditors	10,733 18 7
239 8 6	,, superannuation	976 8 6
3,477 0 6	,, balance	5 1 6
£7,450 10 5		£12,868 1 11

Assets.

£ s. d.		£ s. d.
1,769 15 10	By cash at Bank and at Office ...	907 3 3
16 8 2	,, salaries reserved (premiums) ...	16 8 2
2,292 9 0	,, Instruments in stock	7,729 19 0
1,641 6 8	,, sundry debtors	2,646 8 2
1,730 10 9	,, Admiralty	1,568 3 4
£7,450 10 5		£12,868 1 11

NOTE.—On 30th September the amount of Government securities held for the provision of Superannuation Annuities was £26 14s. 2d. 2½ per cent. Consols, and £989 9s. 6d 5 per cent. War Loan.

Observatories.—Statement of Accounts for the six months ended 30th September, 1918 :—

RICHMOND.

1917. *Receipts.*		1918.	1917. *Payments.*		1918.
£ s. d.		£ s. d.	£ s. d.		£ s. d.
82 0 0	Subventions, Scott Antarctic Fund	—	966 19 7	Salaries, Scheduled	967 13 6
225 12 2	Gassiot Trust ...	110 2 2	28 1 9	Sunday and holiday duty	16 11 10
2 16 0	Expenses refunded locally ...	65 13 4			984 5 4
3 3 7	Tests and Commissions	7 14 6	13 10 10	Cost of forms, &c.	77 17 3
18 7 9	Cost of books and forms refunded	13 3 9	20 3 0	Rent, Rates, Taxes, Repairs and Insurance	27 14 0
814 10 3	Balance	1,023 18 10	47 3 5	Fuel and lighting	46 2 4
			21 3 9	Equipment and instruments ...	8 18 9
			10 8 5	Consumable stores	27 14 3
			8 12 7	Incidental expenses	6 7 1
			2 14 0	Books, &c.	2 5 6
			27 12 5	Postage, telephones and telegrams	34 10 6
			—	Travelling expenses	4 17 7
£1,146 9 9		£1,220 12 7	£1,146 9 9		£1,220 12 7

ESKDALEMUIR.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
500 0 0	Subvention, Royal Society ...	500 0 0	575 6 3	Salaries, Scheduled	686 7 7
10 15 3	Expenses refunded locally ...	6 18 8	43 15 8	Cost of forms, &c.	10 3
225 6 9	Balance	507 1 3	13 0 7	Rent, Rates, Taxes, Repairs and Insurance	13 16 10
			24 2 9	Fuel and lighting	201 5 4
			2 9 6	Equipment and instruments ...	3 10 0
			11 2 6	Consumable stores...	5 19 10
			2 6 9	Incidental expenses	4 15 9
			3 9 0	Books, &c.	12 4 10
			32 13 2	Postage, telephones and telegrams	28 4 2
			27 15 10	Travelling and motor car expenses	57 5 4
£736 2 0		£1,013 19 11	£736 2 0		£1,013 19 11

CAHIRCIVEEN.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
—	Subventions (Rosse Fund) ...	—	276 3 8	Salaries, Scheduled	372 8 3
9 6 6	Expenses refunded locally ...	7 9 0	—	Cost of forms	2 10 5
344 15 8	Balance	453 9 3	35 18 11	Rent, Rates, Taxes, Repairs and Insurance	32 4 1
			9 5 0	Fuel and lighting	7 9 0
			8 1 10	Equipment and instruments ...	7 18 9
			2 6 11	Consumable stores	5 6 2
			1 14 3	Incidental expenses	7 14 5
			1 8 0	Books, &c.	4 13 5
			19 3 7	Postage, telephones and telegrams	20 6 3
			—	Travelling expenses	7 6
£354 2 2		£460 18 3	£354 2 2		£460 18 3

FARNBOROUGH BRANCH OFFICE.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
250 0 0	Subvention (Advisory Committee for Aeronautics)	—	81 17 6	Salaries, Scheduled	316 3 1
16 8 3	Expenses refunded (War Office) ...	—	3 0	Cost of forms	—
—	Balance	424 3 1	12 6 4	Rent, Rates, Taxes, Repairs and Insurance	6 4
			19 3 5	Equipment and instruments ...	45 0 2
			72 19 0	Consumable stores...	11 7
			2 1	Incidental expenses	20 5 8
			1 8 0	Books, &c.	2 5 6
			27 13 2	Postage, telephones and telegrams	34 14 6
			15 9 2	Travelling and motor car expenses	4 16 3
			35 6 7	Balance	—
£266 8 3		£424 3 1	£266 8 3		£424 3 1

FALMOUTH WEATHER STATION.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
8 6 11	Expenses refunded locally... ...	8 17 4	15 0 0	R. Cornwall Polytechnic Society	15 0 0
171 18 3	Balance	278 18 4	102 7 6	Salaries, Scheduled	201 16 2
			—	„ Additional	—
			30 2 10	Rent, Rates, Taxes, Repairs and Insurance	28 16 2
			—	Fuel and lighting	6
			—	Equipment and instruments ...	—
			—	Consumable stores	4 8
			13 1	Incidental expenses	2 4
			—	Books, &c.	17 6
			31 18 9	Postage, telephones and telegrams	38 16 5
			3 0	Travelling expenses	2 1 11
£180 5 2		£287 15 8	£180 5 2		£287 15 8

BENSON.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
—	Expenses refunded locally ...	—	240 10 3	Salaries, Scheduled...	225 5 0
313 11 1	Balance	280 17 6	1 13 6	Overtime, &c.	—
			—	Cost of forms, &c.	—
			—	Rent, Rates, Taxes, Repairs and Insurance...	—
			3 5 0	Fuel and lighting	10 0
			—	Equipment and instruments ...	4 6 3
			45 2 4	Consumable stores	30 2 9
			1 5 4	Incidental expenses	1 9 0
			10 6	Books, &c.	17 6
			21 4 2	Postage, telephones and telegrams	17 0 1
			—	Travelling expenses	1 6 11
£313 11 1		£280 17 6	£313 11 1		£280 17 6

Meteorological Office, Edinburgh.

1917. £ s. d.		1918. £ s. d.	1917. £ s. d.		1918. £ s. d.
189 12 3	Balance	220 7 3	175 0 0	Subvention	205 0 0
			14 12 3	Travelling expenses	15 7 3
£189 12 3		£220 7 3	£189 12 3		£220 7 3

Adv. Com. Atmos. Pollution.

£ s. d.		£ s. d.	£ s. d.		£ s. d
500 0 0	Subvention	250 0 0	57 10 10	Salaries, Scheduled...	25 0 0
			—	Overtime, &c...	21 14 8
			10 10 9	Equipment and instruments ...	9 1
			—	Consumable stores	2 1 0
			18 0	Incidental expenses...	116 8 8
			16 10	Postage, telephones and telegrams	—
			—	Books, &c.	3 13 6
			430 3 7	Balance	80 13 1
£500 0 0		£250 0 0	£500 0 0		£250 0 0

Miscellaneous Stations.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
—	Expenses refunded locally ...	6 15 0	172 5 0	Subventions, Aberdeen, Armagh	172 5 0
63 0 11	Cost of forms refunded	78 12 11	12 10 0	British Rainfall Organisation ...	—
534 14 3	Balance	820 17 2	345 19 0	Salaries of Observers (36) ...	392 13 6
			36 0 0	Cost of forms, &c.	297 10 3
			2 4 5	Rent, Rates, Taxes, Repairs and Insurance	4 1 5
			1 0 9	Fuel and lighting	—
			—	Equipment and instruments ...	4 2 6
			—	Consumable stores	—
			9 9 8	Agents' fees, Incidental expenses, &c....	11 2 1
			2 14 4	Books, &c.	17 6
			15 12 0	Postage, telephones and telegrams	23 12 10
£597 15 2		£906 5 1	£597 15 2		£906 5 1

Meteorological Field Service.

France.

£ s. d.		£ s. d.	£ s. d.		£ s. d.	£ s. d.
545 18 6	War Office	2,788 10 1		Salaries :		
332 4 4	Balance	—	28 15 0	Lt.-Col. E. Gold ...	31 5 0	
			—	Capt. A. H. R. Goldie	—	
			—	Lieut. E. H. Chapman	—	
			13 14 6	Sergt. R. Pyser ...	1 9 0	
			16 18 0	Corpl. E. L. Clinch	9 2 6	
			35 11 10	Corpl. A. G. Goad ...	23 16 11	
			17 2 8	Corpl. C. F. J. Jestico	9 2 6	
			14 2 9	Corpl. R. M. Poulter	3 7 9	
						78 3 8
			126 4 9			
			2 11 0	Cr.—Amounts refunded		—
			123 13 9			
			—	Salaries : Overtime		—
				Incidental Expenses :		
			12 18 5	Postage	13 6 5	
			—	Telegrams ...	—	
			—	Printed books ...	—	
			7 5	Miscellaneous ...	—	
						13 6 5
			741 3 3	Instruments		2,081 5 3
			—	Balance		615 14 4
£878 2 10		£2,788 10 1	£878 2 10			£2,788 10 1

Dardanelles.

£ s. d.		£ s. d.	£ s. d.		£ s. d.	£ s. d.
307 15 2	Admiralty	—		Salaries :		
1,369 12 9	War Office	475 7 3	—	Capt. E. M. Wedderburn	—	
—	Balance	235 1 6	12 16 0	Corpl. C. V. Ockenden	9 2 6	
						9 2 6
			—	Salaries : Overtime		—
				Incidental Expenses :		
			12 2 4	Postage	3 17 3	
			904 6 0	Telegrams ...	265 7 9	
			—	Printed books ...	—	
			—	Miscellaneous ...	—	
						269 5 0
			132 5 5	Instruments		432 1 3
			615 18 2	Balance		—
£1,677 7 11		£710 8 9	£1,677 7 11			£710 8 9

EIGHTY-NINTH MEETING.

South Kensington, S.W.7, 4th December, 1918.

PRESENT:

SIR NAPIER SHAW IN THE CHAIR.

MR. BARSTOW.	CAPTAIN HARVEY.
COLONEL GLENNIE.	COLONEL LYONS.

728. The Minutes (720–727) of the Meeting of the 23rd October, previously circulated, were taken as read, and confirmed.

729. CORRESPONDENCE.—**Admiralty** (Minute 727).—Read—the following letter:—

M.O. 15947.

Office of Chief Censor,
Room 37, Old Building,
Admiralty, S.W.1,
15th November, 1918.

SIR,

I BEG to inform you that the restrictions on the publication of meteorological information have now been completely removed and you are at liberty to revert to your pre-war practice.

Yours faithfully,
D. BROWNRIGG,
Chief Censor, Admiralty.

Applications for appointment on the Professional Staff after demobilisation.—*L. F. Richardson.*—Submitted—M.O. 15403 from the former superintendent of the Observatory at Eskdalemuir proposing a scheme for weather prediction by numerical process from observations over a wide area, and the Chairman's reply thereto (M.O. 15404).

It was agreed to postpone consideration, until a decision had been reached on the more general problems of reconstruction.

Letters received from *Lieut. B. H. Ormsby* and *Mr. H. E. Soper* were also reported.

It was agreed that the names should be placed on the waiting-list.

Air Ministry.—*Establishment of Stations at Lundy Island and Lerwick.*—Read—the following correspondence:—

M.O. 15503.

Air Ministry, F.O. 5 (Meteorology),
5, John St., Adelphi,
London, W.C.2,
6th November, 1918.

DEAR COLONEL LYONS,

IT is intended to establish a complete R.A.F. Meteorological Station at Lerwick and in view of this, I would suggest that this Station might supply the Meteorological Office with the data now forwarded by your present reporting station at Lerwick, the observations for which I understand are at present made by the Coastguard. I should be glad to have your views on the subject before replying to certain objections which have been raised with regard to having two Stations at one place.

Yours sincerely,
R. W. GLENNIE.

M.O. 15823.

Meteorological Office.
South Kensington, S.W.7.
13th November, 1918.

DEAR COLONEL GLENNIE,

YOUR letter about a new station at Lerwick raises several questions which will arise elsewhere when Reporting Stations of this Office and R.A.F. Stations are near to each other.

Firstly: what indicates that the anemometer exposure for example is as good as the old one in any case?

In replacing the old Station by a new one, the new results are not comparable with the older, until several years have elapsed.

Secondly: to utilize an observing Station effectively it may be necessary to issue instructions at short notice. How would that work with R.A.F. Stations? With the Admiral Commanding Coastguard this Office has been able to act virtually as if the Stations were its own.

Thirdly: to know what weight to give to a doubtful report involves knowing the reliability of the Station. At present that is known by inspection and acquaintance with the observer. How is it to be arrived at in future?

France has had serious difficulties in this respect; and is now trying to get over them.

The question is one which needs a discussion to lay down general principles, and which should, I think, come before the Meteorological Committee which meets as you will remember on December 4th.

Yours sincerely,
H. G. LYONS.

The general question of the duplication of stations between the Meteorological Office and the R.A.F. was discussed. It was agreed that such duplication should be avoided where possible, but that each case should be dealt with on its merits as it arose.

730. BRITISH RAINFALL ORGANIZATION (Minute 722).—Read—a letter from Messrs. Price, Waterhouse & Co., Valuers, setting out their opinion as to the sum which might be recommended to the Treasury for payment to the Trustees of the British Rainfall Organization as consideration for the undertaking of the Association.

After discussion it was agreed that a letter should be sent to Dr. Mill to ascertain whether the offer of a capital sum sufficient to produce an annuity of £500 per annum would be acceptable to Dr. Mill and to the Trustees as the consideration for the taking over of the business of the Organization by the Meteorological Office.

731. METEOROLOGICAL RECONSTRUCTION (Minute 674).—Submitted—the following Memorandum by the Chairman on the Organization of the Meteorological Services :—

METEOROLOGICAL COMMITTEE.

MEMORANDUM BY THE CHAIRMAN ON THE ORGANIZATION OF THE METEOROLOGICAL SERVICES.

In circulating the proposal contained in the draft letter forwarded herewith I may note some points that have come under my notice with regard to the organization of the Meteorological Services upon which an understanding should be reached.

(1) *Marine Meteorology.*—Since 1854 the Meteorological Office has made special arrangements for collecting observations from ships of the mercantile marine for the purpose of compiling from them, and from the observations recorded in the logs of H.M. Ships, information for the use of seamen. Within the ten years before the war the observations were supplemented by reports from ships by "wireless," organised by the Marine Division. The observations were used in the Forecast Division for the preparation of daily charts of the Atlantic Ocean and adjoining continents which were published in weekly issues of the Charts of the Atlantic and in the Weekly Weather Report. The issue of both has been suspended during the war and the activity of the Marine Division has been much reduced in other ways because under the menace of submarines the position of ships became very secret information. The regular issue of the monthly charts of the Atlantic and the Indian Seas was maintained with other routine work of the Division.

The whole position of the division now requires consideration. Its work has become too much stereotyped. There was very little active co-operation with the Navy and the working of the Division was too much dominated by an idea that marine meteorology was a separate subject from the meteorology which landsmen cultivated. The meteorological charts stopped short at the coastline.

The superintendent and two senior members of the staff of the Division have passed the age of superannuation and are only retained for the duration of the war. The juniors next in succession have left the office or passed to other work so that a new staff is required. Since the Marine Division was from its inception charged with the duty of preparing charts for publication it has had its own "drawing office" staff for marine work. Other departments had to arrange for their own drawings independently. It has already been proposed to establish a properly organised drawing office for the whole.

In the reconstruction the navigation of the air over the sea must be taken into account.

The observations at the surface will still be of fundamental importance but observations of the upper air over the sea are now necessary. They were shown to be possible before the war by Professor Hergesell on the Prince of Monaco's yacht, by Teisserenc de Bort and Rotch in the "Otaria" commissioned for the purpose, and by officers of the German Navy in the West Indies. In 1913 very valuable meteorological research was carried out for the Board of Trade on board the S.S. "Scotia" by Mr. G. I. Taylor now Major, R.A.F. The organization of observations of the upper air from ships ought therefore to be considered. As a subject of imperial importance the Office has undertaken to report upon hurricanes in all parts of the world. And in other respects the distinction between the meteorology of the sea and that of the land must be discarded.

The question to be answered here is which of the Services is to undertake the continuation and development of the work and with what facilities.

(2) *Forecast Division.*—The information upon which the Office relied for its maps and forecasts was obtained from :—

(1) Seven observatories or "whole time" stations of its own, with too small but fully trained staffs for meteorological work in some cases combined with other geophysical work.

(2) Twenty-seven part time stations provided by appropriation from the Office funds in charge of coastguards, light-keepers, municipal authorities, school masters and various other persons without any technical scientific training.

(3) Wireless observations from ships.

(4) About fifty stations on the continent or Atlantic Islands from Spitzbergen to Madeira and from the Azores to Berlin. The information was supplied in accordance with arrangements for exchange made through the agency of the International Meteorological Committee upon which the Office has always been represented ; for the first 20 years by the Secretary of the Committee and since 1907 by its President.

During the war the area represented on the map has been extended to include Russia, Syria and the whole of the Mediterranean. Long before the war the Government of the United States had extended their area to include the whole of the Northern Hemisphere and there is little doubt that in view of the requirements of aerial navigation steps ought to be taken to realise a proposal made by Teisserenc de Bort to the International Committee in 1907 to obtain reports from a *Réseau Mondial* sufficient for daily reports for the world.

All countries have now their stations for observations of the upper air. They are of immediate utility locally for aerial navigation but the information requires to be properly dealt with in its scientific aspect and brought into relation with the customary daily maps not merely in the interest of airmen, but for the general purposes of meteorology. That part of meteorological work is extraordinarily difficult.

There are already in the kingdom some forty stations where meteorological observations are obtained for the use of airmen. They are in charge of officers of the Royal Air Force or of the United States Navy who have had some *ad hoc* meteorological training but have not much experience of general meteorological problems. From these stations telegraphic reports of observations of wind in the upper air are received three or four times daily and have been co-ordinated as far as possible with the customary office charts.

There are two stations in England and six in France belonging to the Meteorological Section, R.E., in charge of officers with wider meteorological training in direct relation with the Meteorological Office. The meteorological work of this section was originally controlled by the Office and connexion is still secured by the fact that the Commandant of the Service is the Acting Director of the Office. These stations also report some observations of the upper air regularly to the Office. There are besides two experimental air stations associated with the Ministry of Munitions in charge of officers who are highly skilled in physical science and to whom the meteorological problems of the upper air appear as an entirely new field that demands instant exploration with the unrestricted facilities for securing observations that are enjoyed by a fighting service in war-time. One of the difficulties of the Office has been to make it clear that the problems are well known but their solution cannot be reached by observations alone. It requires organisation, co-ordination with special technical scientific methods which cannot keep pace with observation.

From these stations also observations have been received and the need for organisation will be obvious. It is realised for example that the distribution of temperature in the upper air is closely associated with the distribution of cloud, yet the observations of temperature have come to us without any information about clouds.

In this connexion it should be noted that a fundamental principle of organised meteorological work is that all observations reported by telegraph should be repeated in a weekly or monthly sheet to be examined at headquarters for the detection of telegraphic errors. It is the duty of the central office to scrutinise all observations by plotting them on maps so that inquiry may be made of the observers in case of apparent discrepancies. This practice has been waived for the new observations received during the war, but it is quite indispensable for satisfactory working.

Further organisation is required for regulating the distribution of the stations and the method of reporting the observations and for arriving at an understanding with foreign countries as to supplementing the present exchange by observations of the upper air. A letter recently received from Colonel Chaves, Director of the Meteorological Service of the Azores, makes it clear that in the scientific organization of this work, this country can if it will take a leading part. It is equally important that it should work in close co-operation with the dominions beyond the seas as set out in the memorandum of reconstruction.

The present form of message from our own air stations has been allowed to grow up on the basis of a tentative arrangement between the Office and the Meteorological Section at G.H.Q. because in the stress of war no time was convenient for making a change. It is peculiar that the winds of the upper air are observed in degrees and reported in points whereas the observations at the surface are observed in points and reported in degrees ; that kind of anomaly should now be put right.

(3) *The General Meteorological and Statistical Division.*—Another fundamental principle of meteorological organisation is that the observations collected day by day are passed on to the statistical department, to be incorporated with other observations received by post and with the records of self-recording instruments. The whole is summarised in the form of weekly, monthly and annual reports in some common form which is guided by international agreements.

In this way the whole scheme of observations is regularly brought under review and adjusted to form a body of material for the working out of more general problems. The different sides of activity react upon one another as for example in the choice and design of standard and comparable instruments, the adoption of standard conditions of exposure and the choice of hours of observation. Every meteorologist of experience knows how much the progress of meteorology in the past has been retarded by trifling differences of practice. Times without number promising investigations have been ruined for lack of co-ordination of time or place or method which prevents the co-ordination of observations.

Meteorology is the only one of the sciences in which the actual worker is absolutely dependent upon the co-ordination of other peoples' observations and for that reason efficient co-ordination is the primary essential condition of any work that goes beyond the direct and immediate application of an observation.

Experience also indicates that the scientific staff at work upon the discussion of the observations should be intimately associated with all the details of practice of the observers. It is not enough to collect observations and hand them over to scientific experts for what they are worth. Those who are familiar with the organisation of meteorological work in this country in the last thirty years of the nineteenth century will recollect that in spite of the fact that the observations carefully organised passed the scrutiny of by far the most powerful body of scientific men that any country has ever put in charge of meteorological work, little progress was made. The result may fairly be attributed to

the practical dissociation of the work of observing and collating which was in charge of the technical assistants from the work of scientific discussion which was left to the members of the council. It may be concluded from the experience of the 30 years that observation and discussion should go together in a single organisation.

In the memorandum of reconstruction (printed in Minute 674) the necessity for established local centres of distribution and inquiry is pointed out.

In view of these considerations it is desirable to follow some such practical programme as the following :—

(1) To agree as to the establishments required for the various public services, the nature of the observations which each would contribute to the Meteorological Office and the part which they would take in the distribution of information.
(2) To provide for the regular visitation of the observing stations by the professional staff of the Meteorological Office engaged upon the researches for which the observations are employed.
(3) To formulate a scheme of operations and establishment of the Meteorological Office including depots for the distribution of information in London and other localities in accordance with the scheme proposed to the Committee on Reconstruction.
(4) To organise some influential and representative body which can take cognisance of all the meteorological agencies of the various services.

NAPIER SHAW.

Meteorological Office,
November 20th, 1918.

Read—the following Minute of a meeting of 21st November of the Committee of the War Cabinet upon Home Affairs :—

MINUTE OF A MEETING OF THE COMMITTEE OF HOME AFFAIRS.

Sir Frank Heath said that the position of the Meteorological Office had been considered at a Conference presided over by General Weir, of the Air Ministry. General Weir was strongly in favour of the Government Meteorological work being centrally organised, and believed that this need not militate against the experimental and executive work of individual departments closely concerned with meteorology, like the Air Ministry.

The Committee decided to give their approval to the proposal to transfer the Meteorological Office to the Committee of the Privy Council (7 (i)), subject to any representations the departments immediately concerned might wish to make.

The following letter for transmission to the Treasury was approved :—

M.O. 16917.

SIR, 6th December, 1918.

WITH reference to Meteorological Office letters of 1st February and 14th February, 1918, the Meteorological Committee beg leave to represent to their Lordships the need for prompt action with the view of placing the Meteorological Services of the country upon a proper basis.

During the war besides the Meteorological Office three meteorological establishments have been set up, namely—

1. The Meteorological Section R.E. for the Army.
2. The Naval Meteorological Service, a department of the office of the Hydrographer of the Navy.
3. The Meteorological Service of the Air Ministry which is in process of development from the Meteorological Service of the Naval Air Stations now transferred from the Hydrographic Office to the Air Ministry.

For the efficient working of all these Services there should be an organised co-operation between them.

The special nature of meteorological science requires that the utmost care should be taken about the organisation of the services. In certain aspects nothing could be simpler than the work of a meteorological service where definite rules and experience only are required. In many countries all over the world services have been set up with no more scientific provision than that of experience of, and aptitude for, the commoner features of meteorological work, but improvements in practice are contingent upon progress in the science, and that depends upon skilled co-operation in observations for purposes which require, for initiative and control, highly organised scientific training as well as adequate meteorological experience.

There is at present no co-ordinating body which can take into consideration the requirements and the facilties of the several services. Provision has been made enabling the other services to keep themselves informed as to the work of the Meteorological Office and its adjustment to national requirements, but there is no organisation for keeping the office informed of the aims and methods of the other services in respect of meteorological science.

Before the war the Meteorological Office included three departments.

1. A Marine Division representing the original establishment of 1854, and intended to meet the meteorological requirements of the Navy and the Mercantile Marine.
2. A Forecast Division for all parts of the community requiring information about current weather and the prospects of the future.
3. A general Meteorological Section for the meteorology and climatology of the three kingdoms, the Empire and the Globe.

All these divisions were served by a fourth division for the supply of instruments.

During the war arrangements to meet the requirements of the various services have been improvised and the office, recognising the urgency of the demands, has placed all its information and its trained staff at the disposal of the services without any reserve. As far as possible it has arranged to utilise any information obtained for other services of the existence of which it was aware. Its work has been unavoidably hampered by the improvised arrangements for the several services being made without co-ordination, and also by the increasingly secret character of the information. The tendency has been towards complete independence of the several services.

But now that the requirements of each individual service can be disclosed without prejudice to national interests, and meteorological information is no longer necessarily secret, arrangements should forthwith be made for organised co-operation between the services.

The Committee have received a copy of a Minute of the Committee for Home Affairs in which it is recorded that approval was given to "the proposal to transfer the Meteorological Office to the Committee of the Privy Council (7(1)) subject to any representations the departments immediately concerned might wish to make.

The Meteorological Committee are in communication with the department as to the proposal which has been made. It raises a new question as to the future of the office which the Meteorological Committee would wish to be considered by a Committee appointed by H.M. Government. The question of the co-ordination of its work with that of other Meteorological Services might also be similiarly considered.

Having regard to the proposals set out in the Memorandum submitted by the Meteorological Committee to the Ministry of Reconstruction, of which a copy is enclosed, on the necessity for placing the meteorological service on a basis that offers a career for men of ability the Committee submit the following provisions as necessary for the working of the office in present circumstances.

1. Provision for suitable professional staff as set out in the Memorandum on Reconstruction, which would probably involve an addition to the vote of £5,000.
2. Provision for the adequate equipment for all purposes of a number of observatories controlled by the Office as the basis of the study of dynamical meteorology.
3. Provision for the effective study of the meteorology of the upper air over the sea.
4. Facilities for obtaining observations from the Air Stations and by wireless from ships for the purposes of the Daily Weather Report as a practical application of dynamical meteorology.
5. Facilities for obtaining observations for the climatology of the British Isles from stations belonging to local authorities and private persons in all parts of the Kingdom.
6. Facilities for co-operation with the Dominions beyond the seas.
7. Provision for the special internal arrangements of the Office, viz., a drawing office and printing office, a workshop and instruments staff.

The Committee are further of opinion that adequate co-ordination between the Office and the special meteorological services of the departments of State can only be secured by housing all the services in one building so that all may have direct access to the collection of books and records which the Office possesses and the necessity for duplicating telegraphic reports of observations may be avoided.

Some consideration is necessary as to the locality in which premises could be secured which might be shared by all the services, and for this question also a special Committee might find a solution.

With this is also connected the provision of collecting and distributing centres for meteorological information in populous centres in the several Kingdoms. Some general understanding about this, with due regard to the interest of Public Health, Shipping, Aerial Navigation, Agriculture and the Newspaper Press as representing the general public, should be arrived at.

The Committee are reluctant to contemplate any fundamental change in the organisation of the operations of the office and its observatories. Its scientific work in recent years has been successful beyond expectation. While the meteorologists of other countries have confined their attention to the usual matters of detail our own have worked towards the establishment of general principles and have achieved astonishing success. In particular the setting out of the relations of pressure, temperature and density throughout the atmosphere by W. H. Dines (not yet published) and the investigation by Major Taylor of the part played by eddy-motion in the atmospheric phenomena have led to general meteorological principles of the highest importance. When the contributions of the Office are put together they form a coherent and organised advance in meteorological science which has no parallel and which has made it possible to approach the technical questions of the Artillery and Air Services with an insight which has been recognised in communications from officers concerned, and which so far as is known no other country possesses. It has been achieved by a powerful combination with what seem to be very limited resources. The real secret of the success is that every member of the staff throughout the whole organisation has been on the look-out to do his best and help his comrades. The fitting in of the several contributions to form a homogeneous structure is perhaps a lucky chance. No chance could have been more lucky. Any alteration of the relations between the various units which interfered with these fortunate conditions would be a most serious misfortune for British meteorology.

I am, &c.,
NAPIER SHAW,

The Secretary,
H.M. Treasury,
Whitehall.

It was agreed that a letter should be sent to the Department of Scientific and Industrial Research to ask for more definite information as to the proposals for the future organisation of the Office.

732. Office Staff.—**Resignation.—Miss M. G. Littlecott** (Minute 695).—Reported—that the resignation of Miss M. G. Littlecott, Probationer in the Forecast Division had been accepted as from 2nd November, 1918. (Order 766).

Orders for Confirmation.—Reported—the following Director's Orders for confirmation :—

Order 763. **J. C. Woods** (Minute 695), Office Boy and Messenger in the Instruments Division is graded as Boy Assistant with wages of 14*s.* 6*d.* per week and War Bonus, to date from 10th September, 1918.

Order 764. **A. H. French** (Minute 630), Office Boy and Messenger is graded as Boy Assistant with wages of 14*s.* 6*d.* per week and War Bonus, to date from 7th October.

Order 769. **Campbell McRae** (Minute 715) (Aberdeen Observatory) is engaged as Boy Clerk to assist Mr. G. A. Clarke at 24*s.* 6*d.* per week, inclusive of War Bonus, to date from 1st October, 1918.

Order 770. The emoluments of **Miss A. M. Coleman** (Minute 695), Assistant in the Accounts Branch, are to be regarded as salary £186 per annum and War Bonus £33 as from 1st July.

Order 772. **Miss G. F. Cocks, M.Sc.** (Minute 715), is appointed Senior Professional Assistant in the Forecast Division at a salary of £225 per annum and War Bonus, to date from 11th November, 1918. The appointment to be terminable by three months' notice on either side.

Order 773. **Miss A. J. Clapham** is appointed as Clerk Computer at a salary of £75 per annum and War Bonus. The appointment to date from 18th November and to be terminable by one month's notice on either side.

Order 781. The emoluments of **Miss E. F. Walker** (Minute 708), Senior Professional Assistant are to be regarded as salary £202 6*s.* 8*d.* and War Bonus £22 13*s.* 4*d.* Miss Walker will be entitled to increase of War Bonus allowed by the Committee subsequent to 13th August, 1918.

Approved.

Recommended for Increase of Salary.—Recommended—that **A. C. D. Miller** (Minute 695), Temporary Assistant in the Forecast Division, be promoted to Clerk Computer as from 1st November, 1918, with a salary of £75 per annum and normal War Bonus. A special allowance of £18 15*s.* per annum to be paid on account of attendance at irregular hours.

Recommended—that **F. C. Warmington** (Minute 667), Boy Clerk, in the Forecast Division be promoted to Clerk Computer as from 18th November, the date of his taking up night duty with a salary of £75 per annum and normal War Bonus. A special allowance of £18 15*s.* per annum to be paid on account of attendance at irregular hours.

Approved.

Return of Staff on Demobilisation.—It was agreed that enquiry should be made as to whether the officers whose places are being kept open for them, wish to return.

Superannuation (Minute 591).—Reported—that Captain Hepworth, Superintendent of the Marine Division (April, 1914), Mr. W. Allingham, Principal Assistant (August, 1915), and Mr. W. G. James, Chief Draughtsman of the same Division (September, 1915), Mr. H. Harries, Forecaster (January, 1917), Mr. F. J. Brodie, Forecaster (December, 1917), Mr. R. F. Wallace, Principal Assistant, Instruments Division (September, 1917), Mr. J. Sheerman, Principal Assistant, Statistical Division (March, 1918) were continued in their appointments after attaining the age of superannuation, at the date given in the brackets, in the terms of Minute 591. Mr. J. A. Curtis and Mr. C. Harding who were superannuated before the war were on duty at the Office on special terms. Also that Mr. T. Duncan Bell will reach the age of superannuation in June, 1919.

War Bonus.—In accordance with Awards Nos. 65 and 66 of the Conciliation and Arbitration Board for Government employees it was agreed subject to Treasury sanction, if necessary, to allow war bonus to employees on the Office Staff at the following rates in lieu of the rates authorised by Minute 723 :—

——	Men.	Women.
Remuneration not exceeding 60*s.* per week :—		
Employees of 21 years of age and upwards	23*s.*	15*s.*
„ under 21 but not under 18 years of age...	17*s.*	15*s.*
„ under 18 years of age	11*s.* 6*d.*	11*s.* 6*d.*
Remuneration exceeding £156 10*s.* but not exceeding £233 6*s.* 8*d.*	£60 per annum	£40 per annum
Remuneration exceeding £233 6*s.* 8*d.* but not exceeding £235.	15 per cent. of salary + £25 per annum.	£40 per annum
Remuneration exceeding £235 but not exceeding £250.	15 per cent. of salary + £25 per annum.	10 per cent. of salary + £16 10*s.* per annum.
Remuneration exceeding £250 but not exceeding £312 10*s.*	£62 10*s.* per annum	£41 10*s.* per annum
Remuneration exceeding £312 10*s.* but not exceeding £350.	12 per cent. of salary + £25 per annum.	8 per cent. of salary + £16 10*s.* per annum.
Remuneration exceeding £350 but not exceeding £420	£67 per annum	£44 10*s.* per annum
„ „ £420 „ „ £500	10 per cent. of salary + £25 per annum.	6·6 per cent. of salary + £16 10*s.* per annum.

The Award to be subject to the same provisions as the previous award except that war bonus shall count for overtime pay as from 1st November, 1918.

733. Observatories.—**South Farnborough Branch Office** (Minute 721).—Reported—the following correspondence :—

M.O. 14370.

Meteorological Office,
South Kensington, S.W.7.
17th October, 1918.

The Meteorological Committee have under consideration at the present time, whether the Meteorological Office at South Farnborough should be maintained, otherwise than what is necessary for the directional wireless section which is required for the location of the distant thunderstorms. This branch of the Meteorological Office was originally established at the request of the War Office for obtaining accurate meteorological information for use in aeronautical work and copies of the letters which passed at the time are attached.

The increasing demands which are being made at the meteorological observatories of this Office render it necessary to increase their staff and the personnel at South Farnborough could, it is thought, be more efficiently utilised at one of these Observatories, if the local requirements can be otherwise satisfied.

The Committee would be glad to know whether the G.O.C., Aldershot Command, desires the retention of the meteorological station at South Farnborough. Daily forecasts could be telegraphed direct from the Meteorological Office in London to Aldershot to replace those which the Command now receives from the same Office through Farnborough Branch Office, or if expert meteorological advice is desired, this may perhaps be supplied by establishing a detachment of the Meteorological Section, R.E., in the Command.

H. G. Lyons, Colonel,
Commandant Meteor. Services.

A. A. General, R.E.,
War Office, S.W.1.

M.O. 14370.

Meteorological Office,
South Kensington, S.W.7.
17th October, 1918.

Sir,

The Meteorological Committee have under consideration at the present time, whether the Meteorological Office at South Farnborough should be maintained, otherwise than what is necessary for the directional wireless section which is required for the location of distant thunderstorms. This branch of the Meteorological Office was originally established at the request of the War Office for obtaining accurate meteorological information for use in aeronautical works, and copies of the letters which passed at the time are attached.

The increasing demands which are being made of the Meteorological Observatories of this Office render it necessary to increase their staff and the personnel at South Farnborough could, it is thought, be more efficiently utilised at one of these Observatories, if the local requirements can be otherwise satisfied.

The Committee would be glad to know whether you desire the retention of the meteorological station at South Farnborough. Daily forecasts could be telegraphed direct from the Meteorological Office in London to you to replace those which you now receive from the same Office through the Farnborough Branch Office.

I am, &c.,
H. G. Lyons, Colonel,
Director.

The Superintendent,
Royal Aircraft Establishment,
South Farnborough.

132/D/1/7.—M.O. 14892.

Royal Aircraft Establishment,
South Farnborough,
October 25th, 1918.

We have to acknowledge your letter of the 17th inst. We are of opinion that the small local use which is made of the Meteorological Station in the R.A.E. does not justify its retention here if the personnel are required elsewhere.

All that we require are :

(*a*) Forecasts as now received.

(*b*) Daily Barometer record.

In connection with the Meteorological Station here there are, however, recording instruments at the Pyestock observation tower whose records are, we understand, of great value meteorologically, though of little immediate service to us.

In order to meet both our needs and yours we propose that the instruments now here and at Pyestock should either be taken over by the R.A.E., who will continue to observe them, or that a small station of the Meteorological Section of the R.A.F. be formed here, to continue the work and to act also for the S.A.R.D. and R.A.F. Wireless School here. We are writing Colonel Glennie on this matter.

It may however be understood that so far as the R.A.E. is concerned, we are quite agreeable to the removal of your observers and are prepared to take over the instruments and their observation and the distribution of forecasts in the R.A.E. at any time.

W. SYDNEY SMITH,
Superintendent, R.A.E.

The Director,
Meteorological Office,
South Kensington, S.W.7.

M.O. 16281. 42/Aircraft Factories/560 (AG7b).

Commandant,
Army Meteorological Services.

With reference to your minute dated 17–10–18, No. 14370, regarding the maintenance of the Meteorological Office at South Farnborough, will you please note that a report has been received from the General Officer Commanding-in-Chief, Aldershot Command, stating that there is no Command objection to the proposal to abolish the Office.

H. N. KERMACK, Staff Capt.,
for Brigadier-General, A.A. General, R.E.

War Office, S.W.,
21st November, 1918.

It was agreed that the matter should stand over pending a general decision on the question of reorganisation.

Scottish Meteorological Society (Minute 696).—Reported—that a letter M.O. 16688 had been received from the Treasurer requesting that the grant to the Edinburgh Office should be increased in order that the superintendent and assistants might be placed in the same position with regard to War Bonus as the staff of the Office.

An additional grant of £57 10*s.* per annum for this purpose was approved.

734. ESTIMATES.—In accordance with Treasury letter 44025 (M.O. 16274) an estimate of expenses of the Office was approved as follows :—

METEOROLOGICAL OFFICE. ESTIMATES for the Year 1919-20.

—	Proposed, 1919-20.	Voted, 1918-19.	Increase.	Decrease.
	£	£	£	£
Adviser	1,000	1,000	—	—
Director	161	—	161	—
Salaries :				
Office	15,887	14,284	1,603	—
Observatories	5,601	4,627	974	—
War bonus	4,316	1,250	3,066	—
Meteorological Field Service	1,913	1,647	266	—
Expenses of Office :				
Rent, heating, and lighting	700	700	—	—
Furniture and equipment	50	100	—	50
Library	25	50	—	25
Insurance and repairs	120	120	—	—
Incidental expenses and consumable stores	300	200	100	—
Post Office charges :				
Postage	1,250	800	450	—
Telephones	200	120	80	—
Telegrams	4,110	4,110	—	—
Stationery Office (S.O.P.)	120	120	—	—
Travelling expenses	200	150	50	—
Superannuation allowances :				
Annuities	562	562	—	—
Pensions not chargeable on Fund	25	25	—	—
„ chargeable on Fund	132	276	—	144
Contribution to Fund	1,000	1,000	—	—
Cost of instruments	30,000	10,000	20,000	—
Expenses of M.O. Observatories :				
Subventions	30	30	—	—
Rent, rates, taxes, repairs, and insurance	222	192	30	—
Fuel and lighting	323	263	60	—
Equipment and instruments	265	464	—	199
Cost of forms	136	125	11	—
Consumable stores	177	148	29	—
Books, &c.	65	60	5	—
Incidental expenses	85	91	—	6
Postage, telegrams, and telephones	360	280	80	—
Travelling and motor car expenses	92	127	—	35
Reserve Fund	—	—	—	—
Expenses of auxiliary observatories :				
Subventions (2)	345	345	—	—
Telegraphic, anemographic, and W.W.R. stations	1,000	770	230	—
Incidental expenses of stations, ships, &c.	405	265	140	—
Atmospheric Pollution	500	500	—	—
British Rainfall Organization	55	55	—	—
Edinburgh Office	500	380	120	—
Lectures and experiments :				
Schuster Readership	—	—	—	—
Unassigned	457	206	251	—
	72,689	45,442	27,706	459
APPROPRIATIONS-IN-AID.				
Subventions for observatories :				
Atmospheric Pollution	500	500	—	—
Royal Society	1,400	1,500	—	100
War Office	100	100	—	—
Expenses refunded :				
M.O. observatories	155	120	35	—
Auxiliary observatories and stations	160	130	30	—
M.O. departmental	1,500	420	1,080	—
M.O. incidental	150	150	—	—
Stationery Office account	120	120	—	—
M.O. telegraphic expenses	150	—	150	—
M.O. telephone charges	100	2	98	—
M.O. postage expenses	450	—	450	—
Inspections	100	100	—	—
Instruments	29,700	9,700	20,000	—
Superannuation, annuities and interest	604	604	—	—
Lectures and experiments	—	—	—	—
Total Appropriations-in-Aid	35,189	13,446	21,843	100
Army pay and deductions on account of members of staff on War Service	—	2,496	—	—
Net totals	35,189	15,942	—	—
[Vote of credit, Salaries	—	4,500]	—	—
[„ „ „ Telegrams	—	2,500]	—	—
Parliamentary Grant-in-Aid	37,500	22,500	—	—
	72,689	45,442	—	—

STATEMENT OF ESTIMATED CHARGES UPON THE GRANT FOR 1919–20.

SALARIES, including normal increases: OFFICE AND OBSERVATORIES.

SCHEDULE II.

Establishment.	—	Meteorological Field Service.	Administration and Library.	I. Marine Division.	II. Forecast Division.	III. Statistical Division.	IV. Instruments Division.	Richmond.	Eskdalemuir.	Cahirciveen.	Falmouth.	Farnborough.	Benson.	Atmos. Polln.	Totals. 1919–20.	
																£
	Adviser	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1,000
	Director	—	—	—	—	—	—	—	—	—	—	—	—	—	—	161
	Professional Staff:															
10	Superintendents, and Meteorologists-in-Charge.	1	—	1	1	1[1]	1	1	1	1	1	1	1	1	12	4,862
7	Senior Professional Assistants (225–375)	1	3	—	5[1]	1	—	1	—	1	—	—	—	—	12	3,210
5	Junior Professional Assistants (125–200)	2	1	—	3[2]	—	—	—	—	—	—	1	—	—	7	1,348
1	Graduate Assistants (60–100)	—	1*	—	—	—	—	—	—	—	—	—	—	—	1	80
	Classified Clerical and Technical Staff:															
12	Chief Clerk and Assistants (175–330)	—	5	3	7	3	4	2	1	—	—	—	1	—	26†	5,900
8	Clerks (125–150)	—	2	3	—	3	—	—	—	—	1	—	—	—	9	1,368
	Clerk Assistants (75–150)	—	1	1	1	2	2	—	1	—	—	—	—	—	8	878
8	Clerk Computers (75–110)	1	1	1	2[1]	1	4	—	1	—	—	1	—	—	12	1,165
	Additional Staff:															
	Mechanical Assistants	—	—	—	—	—	—	1	1	—	—	—	—	—	2	221
	Supernumerary Clerks	—	—	—	—	1	—	—	—	1	—	—	—	—	2	180
	Probationers	4	4[1]	1	4[2]	2	1	2	—	—	—	—	—	—	17	975
	Boy and Girl Clerks	3	7	—	4	4[1]	—	1[1]	4	2	1[1]	—	—	—	26	1,539
	Office or Laboratory Boys and Improvers.	—	—	—	—	—	2	—	—	—	—	—	—	—	2	173
	Allowance for Vacancies and Revision.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Office Keeper's Staff:															
	Office Keepers ... (80–110)	1	2[1]	—	—	—	—	—	—	—	—	—	—	—	3	294
2	Storekeeper	1	[1]	—	—	—	—	—	—	—	—	—	—	—	1	100
	Caretakers	—	—	—	—	—	—	1	1	—	—	—	—	—	2	157
	Messengers	—	1	—	—	—	—	1	1	1	—	—	—	—	4	237
	Boy Messengers	—	5	—	—	—	2	1	—	—	—	—	—	—	8	369
	Cleaners	—	4	—	—	—	1	1	1	1	—	—	—	—	8	231
	Watchman	—	1	—	—	—	—	—	—	—	—	—	—	—	1	30
	Lift Attendant	—	1	—	—	—	—	—	—	—	—	—	—	—	1	60
	War Bonus															
	Occasional Sunday Duty ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	79
	Insurance (National Health and Employers' Liability).	—	—	—	—	—	—	—	—	—	—	—	—	—	—	45
	TOTALS	14	42	10	33	20	17	13	12	7	4	3	2	1	164	24,602
	£	1913	122, £17,048					42, £5,701								
	Army Pay and deductions on account of members of the Staff on War Service.														30	2,837
	NET TOTALS														134	21,825

* On special service leave without pay.

[ ] Means that the occupant of the post is on duty with the Field Service or *vice versa*.

† This number includes 9 members of the staff who will have passed the age-limit for superannuation by April 1, 1919, 1 absent as an officer of the R.A.F. and two mechanical assistants on special appointment.

M.O. OBSERVATORIES AT

Service.	Richmond.		Eskdalemuir.		Cahirciveen.		Falmouth.		Farnborough.		Benson.		TOTAL.		Atmos. Polln.		Edinburgh Office.		Auxiliary Observatories and Stations.	
	1918-19.	1919-20.	1918-19.	1919-20.	1918-19.	1919-20.	1918-19.	1919-20.	1918-19.	1919-20.	1918-19.	1919-20.	1918-19.	1919-20.	1918-19.	1919-20.	1918-19.	1919-20.	1918-19.	1919-20.
EXPENDITURE.	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
Salaries (*see* Schedule II.) ...	1,588	1,896	1,376	1,486	589	842	180	432	411	555	383	390	4,527	5,601	100	100	—	—	770	1,000
Fixed Charges	—	—	—	—	—	—	30	30	—	—	—	—	30	30	—	—	350	410	400	400
Cost of Forms	40	80	90	50	4	5	—	—	—	—	1	1	135	136	—	—	—	—	175	300
Rent, Rates, Taxes, Repairs and Insurance.	80	70	50	25	70	70	30	30	25	25	2	2	257	222	—	—	—	—	10	10
Fuel and Lighting	100	100	120	200	18	18	—	—	—	—	5	5	243	323	—	—	—	—	—	—
Equipment and Instruments...	100	80	100	100	12	15	13	10	50	50	7	10	282	265	50	50	—	—	—	10
Consumable Stores	30	50	30	30	6	10	2	2	80	20	90	65	238	177	—	10	—	—	—	—
Incidental Expenses	30	30	15	15	5	10	5	5	5	20	5	5	65	85	340	320	—	—	35	30
Books, &c.	10	20	20	20	5	10	5	5	5	5	5	5	50	65	—	10	—	—	10	5
Postage, Telephones and Telegrams.	58	65	70	60	40	40	65	80	100	75	40	40	373	360	10	10	—	—	50	50
Travelling and Motor Car Expenses.	2	5	55	60	—	2	10	10	35	10	5	5	107	92	—	—	30	30	—	—
Reserve Fund	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
TOTALS (exclusive of Salaries)	450	500	550	560	160	180	160	172	300	205	160	138	1,780	1,755	400	400	380	440	280 +400	405 +400
APPROPRIATIONS IN AID.																				
Subventions :—																				
Gassiot Fund ... } Royal	500	400	—	—	—	—	—	—	—	—	—	—	500	400	—	—	—	—	—	—
Parliamentary Grant } Society.	—	—	1,000	1,000	—	—	—	—	—	—	—	—	1,000	1,000	—	—	—	—	—	—
Rosse Fund ... }	—	—	—	—	11	11	—	—	—	—	—	—	11	11	—	—	—	—	—	—
Advisory Committee ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
War Office	—	—	—	—	—	—	—	—	100	100	—	—	100	100	—	—	—	—	—	—
Atmospheric Pollution ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	500	500	—	—	—	—
Grazing Rent	4	4	—	—	17	10	—	—	—	—	—	—	21	14	—	—	—	—	—	—
Rent of Rooms...	—	—	76	76	—	—	—	—	—	—	—	—	76	76	—	—	—	—	—	—
Testing Instruments and Commissions.	8	15	—	—	—	—	—	—	—	—	—	—	8	15	—	—	—	—	—	—
Other expenses refunded locally	30	156	20	20	—	5	15	18	—	—	—	—	65	199	—	—	—	—	130	172
TOTALS...	542	575	1,096	1,096	28	26	15	18	100	100	—	—	1,781	1,815	500	500	—	—	130	172

735. PUBLICATIONS.—(M.O. 234) **Manual of Meteorology** (Minute 726).—Reported —the following letter :—

C. 811/18—M.O. 15596.

H.M. Stationery Office,
Westminster, S.W.1.
6th November, 1918.

SIR,

WITH reference to your letter of the 25th ultimo (Reference 14839), I am directed by the Controller to acquaint you that no objection will be taken to the reproduction in the "Manual of Meteorology" of the illustrations from publications of the Meteorological Office and the Advisory Committee for Aeronautics as specified by you, provided—

(1) the source from which the reproductions are taken be duly acknowledged.
(2) that mention be made of the fact that the permission of the Controller of His Majesty's Stationery Office has been obtained.
(3) that any copies required for Official use be supplied by the Cambridge University Press at the price of 15*s.* per copy.

I am to add that it is assumed that the supply of copies of a confidential issue of Part IV of the Manual is a matter for arrangement between yourself and the Cambridge University Press.

I am, &c.,
L. M. HILL,
for Deputy Controller.

The Director,
Meteorological Office,
S.W.7.

It was agreed to proceed with the publication.

Authority was given for the publication of two papers by Captain E. H. Chapman, "The Variation of Wind Velocity with Height" and "On the use of the Normal Curve of Errors in classifying observations in Meteorology," in such form as the Chairman and the Director should approve.

736. PROFESSIONAL INSTRUCTION.—Reported—the following note of a course of instruction for U.S. officers arranged at the request of Professor A. McAdie, of Harvard University, Lieut. Commander in the U.S. Naval Reserve Corps.

COURSE OF INSTRUCTION AT THE METEOROLOGICAL OFFICE FOR METEOROLOGISTS OF THE U.S. NAVY.

The Officers will attend a course of instruction from 10 a.m. Thursday, May 9th.

They will be provided with copies of synoptic telegrams which are sent to G.H.Q. France and will familiarize themselves with the code employed in these messages. They will also have the pilot-balloon data available for each day.

They will then plot the observations on working charts and fill in the isobars and when they have become familiar with drawing maps will proceed to draw up reports on the present weather on the lines of those issued in the B. report, making use of upper air data and the geostrophic wind for each district.

They will also devote some attention to "Aircraft Weather" and "Changes in Progress."

After sufficient practice at this part of the work, they will go on to draw up forecasts for 24 hours, paying particular attention to the conditions in Ireland.

After gaining experience of this part of the work they will practise drawing up N. Supplements from the same data, paying attention particularly to the waters surrounding the British coast.

In order to gain an insight into the current weather conditions and the changes from day to day they will attend in the forecast room 12.15 p.m.—12.30 p.m. in the morning and from 4.45—5.15 p.m. in the afternoon to discuss the present conditions with the forecaster or professional assistant in charge of the maps.

Meteorological Office.
8th May, 1918.

737. DIRECTOR'S REPORT AND ACCOUNTS :—

Reported that—after visiting the Meteorological Section R.E. at G.H.Q. France he proceeded to Paris, where a conference was held at the office of General Bourgeois, Directeur du Service Météorologique Militaire, in the Ministry of War.

Colonel Glennie, C.M.G., R.A.F., Lieut.-Colonel E. Gold, D.S.O., R.E., Major G. I. Taylor, R.A.F., Captain Schereschewsky, Chef du Service Météorologique aux Armées Françaises, and Captain Bénard, Agent de liaison du Service Météorologique Militaire, were present.

The necessity for increasing the amount of information in meteorological reports was discussed in the light of experience gained during the war, and it was agreed that this would require some modification in the code employed for national and international meteorological reports.

General Bourgeois announced that reports from a series of stations in France were about to be issued thrice daily at 9h.45m., 16h. and 22h.30m. by wireless telegraphy from the Eiffel Tower. The utility of such reports was recognized, but greater rapidity in collection at the Central Station was highly desirable.

A proposal was made that greater uniformity was desirable in the publications of different meteorological services in order to facilitate reference to them.

The opinion was expressed that meetings of the Directors of Meteorological Services would probably be more frequent in the future, and that they would have a more official character than in the past since the importance of meteorology to various State Services had now been more fully recognised

Colonel Lyons reported that having received papers of demobilization he might before long receive orders to return to the Board of Education, from which he had been called up in September, 1914.

Accounts.—Submitted—the following Statement of the Bank Account in the Cash Book :—

	£	s.	d.
Balance on 22nd October, 1918	4,876	16	4
Receipts from 22nd October to 3rd December, 1918	4,485	0	5
	9,361	16	9
Cheques drawn from 22nd October to 3rd December, 1918 ...	8,392	3	4
Bank Balance on 3rd December, 1918	£969	13	5

NINETIETH MEETING.

South Kensington, S.W.7, 29th January, 1919.

PRESENT :

SIR NAPIER SHAW IN THE CHAIR.

CAPTAIN HARVEY. | COLONEL LYONS.
THE HYDROGRAPHER. | SIR THOMAS MIDDLETON.

DR. SCHUSTER.

COLONEL BLANDY attended the meeting for the Air Ministry in place of Colonel Glennie retired.

738. The Minutes 728–737 of the Meeting of 4th December, previously circulated, were taken as read and confirmed.

Arising out of the Minutes of the last meeting it was reported that several further applications had been received for appointment on the Professional Staff (Minute 729), also that Captain E. H. Chapman on demobilisation had resigned his appointment on the Staff of the Office. (Minute 732.)

739. CORRESPONDENCE.—**Admiralty.**—*Collection of Reports from the Atlantic by Wireless Telegraphy*—Reported—the following correspondence :—

M.O. 93.—M. 57832.

Admiralty,
31st December, 1918.

SIR,

I AM commanded by My Lords Commissioners of the Admiralty to transmit herewith copy of a letter dated 9th December, which has been received from the Chief of the U.S. Naval Aerographic Service, relative to a proposed extension of weather service over the North Atlantic Ocean.

My Lords would be glad to be furnished with your observations on this subject.

I am, &c.,
J. W. S. ANDERSON.

The Directer,
Meteorological Office.

A—6—F.

U.S. Naval Forces Operating in European Waters,
30, Grosvenor Gardens, S.W.1.
9th December, 1918.

From :—Chief of the U.S. Naval Aerographic Service.
To :—The Hydrographer, for Admiralty Meteorological Service.

Subject : "Ocean Aerography."

1. It is proposed that a weather service be established which will link the current daily reports, maps and forcasts as published by the Meteorological Office, in London, and by the Weather Bureau in Washington.

2. The system would comprise for the present two services, (*a*) reports at stated hours from ships, and (*b*) return reports to them. The second will be subsidiary, and not essential to the primary purpose of tracing storm tracks on the high seas. As a basis "Pilot Charts of the North Atlantic Ocean" divided into 50° squares, each square considered a potential reporting station, may be used as the skeleton. In the crowded lanes only certain ships would be directed to report, but in areas such as that North of the line Belle Isle, Cape Fear and Iceland each ship furnished with wireless may be a reporting station, without fear of clogging the air. A relay arrangement must be decided upon, according to established Naval System, to provide that more comprehensive information will reach shore stations than the limit of audibility of the smaller sets would furnish.

3. The information required to be sent would be brief, comprising wind direction and force, barometer and tendency and the state of the weather, with the time of observation, the square of the chart, and the name of the ship. This will require the inspection of the barometers much as boilers are supervised by the Navy now. Subsequently, the information may be extended as ships are provided with standardized thermometers and hygrometers. The observations would be made at the usual G.M.T. hours.

4. Within three hours of the observation time summaries and forecasts should be available for transmittal to all ships in each square.

5. The quality of the information received may be expected to be more or less questionable at first, due to the conservatism of merchantmen, and the necessity of acting through Commercial Wireless companies, but when its value is appreciated after experience we shall doubtless have cordial assistance.

6. The control and direction of the service outlined would be a Naval matter and it seems desirable also to enlist the aid of civilian services on both sides of the seas, extending ultimately over the hemisphere.

ROSWELL F. BARRON.

M.O. 189.

Meteorological Office,
South Kensington, S.W.7.,
3rd January, 1919.

SIR,

WITH reference to Admiralty letter M. 57832 of 31st December, 1918, and the proposals of the Chief of the U.S. Aerographic Service for a trans-Atlantic supply of meteorological information, I would bring to your notice that such a system was in operation in this Office from 1909 up to the outbreak of hostilities, when all wireless reports were stopped. At first such reports were received from ships of His Majesty's Navy only, but a few months later Atlantic Liners and other ships began to supply them, also through an arrangement with the Marconi Company.

By 1913 most of the difficulties of organization had been overcome and the supply and use of such reports was steadily growing in effectiveness.

The further extension of this service in connection with the Meteorological Service of the United States is very desirable, and I would suggest that the most effective means for moving in the matter would be to hold, at an early date, a Conference of those immediately interested in this form of collection and distribution of meteorological information, since there are several important points which are not mentioned in the proposals, but which would greatly increase the efficiency of Atlantic Weather Reports; and also the adjustment of the existing system of Meteorological Office for Radio-telegraphic Reports to co-operate with that of the United States will be more easily prepared after a preliminary discussion.

A copy of the last edition of instructions for observing and coding messages for such Radio-telegraphic Reports from ships, which were issued by this Office in 1914 is enclosed.

I am, &c.,
H. G. LYONS, Colonel,
Director.

The Secretary,
Admiralty,
Whitehall, S.W.1.

Admiralty.—*Meteorological Telegrams for Switzerland.*—Read—the following letter from the Hydrographer.

M.O. 17818.—A.M.S. 13/18.

Hydrographic Department,
Admiralty,
Whitehall, London, S.W.1.,
27th December, 1918.

SIR,

I SHALL be obliged if the despatch of all meteorological data formerly sent viâ Hamburg to the Secretary of the Meteorological Bureau, Zurich, by the Meteorological Office, may be resumed with a view to reciprocity, and despatched with the greatest possible urgency. It is requested that this Department may be informed in detail of the information which will be transmitted.

I am, &c.,
J. F. PARRY,
Hydrographer.

The Director,
Meteorological Office.

It was reported that the telegrams had been despatched but that the question of payment had still to be decided.

War Office.—*Provision of Meteorological Staff for Military Requirements.*—Reported—the following correspondence:—

M.O. 754.—G.B./7937 (A.G. 7. b.)

The Commandant,
Army Meteorological Services.

In reply to your letter No. 17825 dated 30/12/18 the present proposal is that the Army Meteorological Service shall be undertaken by the Meteorological Office who will supply the personnel necessary when requested.

It will probably be necessary to retain the personnel of the present Meteorological Section, R.E. till the future is definitely settled and substitutes provided by the Meteorological Office.

It will therefore be necessary for you to retain from demobilisation such personnel as you consider necessary to carry on the work in hand. Please arrange accordingly.

T. A. H. BIGGE,
Brigadier-General,
A.A. General, R.E.

War Office,
S.W.1.,
14th January, 1919.

It was reported that a conference had since been held at the War Office (M.O. 01512) to consider the future military requirements in the matter of Meteorological Services, and that it had been decided that the State Meteorological Service should be asked to provide the personnel for the War Office requirements.

It was agreed that the Committee should undertake to supply the personnel immediately required, viz., 5 meteorologists and 16 technical assistants, and that application should be made to the Treasury for an additional grant for this purpose. The question of the further requirements of the War Office was left for settlement in connection with the future status and scope of the Meteorological Office.

Demobilisation (Minute 732).—*Release of Staff.*—Reported—that demobilisation was going on and that three or four of the Staff in the lower grades had already returned. The question of the placing of men who had held responsible positions in the army superior to their former position in the Office was covered by the new cadre of State Services.

Reported further—that Captain C. J. P. Cave, now officer commanding of the Meteorological Section, R.E. (Home), at Salisbury, would shortly be demobilised.

It was agreed that the thanks of the Committee be given to Captain Cave for his aid during the war.

Air Ministry.—*Synoptic Telegrams no longer required:*—Read—the following correspondence:—

M.O. 17638.—Met. 1094/18.

Air Ministry,
F.O. 5 (Meteorology),
5, John Street,
Adelphi, W.C.2.,
20th December, 1918.

SIR,

I AM directed to request that the synoptic telegrams now being sent from your Office to R.A.F. Stations be discontinued after December 22nd, 1918.

I am, &c.,
R. W. GLENNIE,
Colonel, Air Staff.

The Director,
Meteorological Office.

M.O. 417.—Met. 63/19.

Air Ministry,
F.O. 5 (Meteorology),
5, John Street,
Adelphi, W.C.2.,
8th January, 1919.

SIR,

I AM directed to request that the issue of E Reports to all R.A.F. Units may cease forthwith.

I am, &c.,
A. E. GENDLE,
Major, F.O. 5. A.

The Director,
Meteorological Office.

Ministry of Reconstruction.—*Request for Report of Work of the Meteorological Office during the war.*—Reported—a letter from the Ministry of Reconstruction asking for a Report of Work of the Meteorological Office during the war.

The Chairman undertook to prepare a report.

Meteorological Institute of Norway.—*Transmission of British Telegrams to Norway.*—Reported—the following correspondence:—

M.O. 00161.

Det Norske Meteorologiske Institut,
Kristiania,
19th December, 1918.

DEAR SIR,

BY request of Deutsche Seewarte in Hamburg I beg leave to ask if the meteorological telegrams from the English stations may be sent to Hamburg from Kristiania. Deutsche Seewarte communicates that the telegrams only will be used for the agricultural weather service as the war now is finished, and that they are of particular importance because the provisionary weather stations during the war now have finished.

I am, &c.,
T. HESSELBERG.

The Director,
Meteorological Office.

M.O. 00958.

Meteorological Office,
South Kensington, S.W.7.,
20th January, 1919.

SIR,

In reply to your letter of the 19th December, 1918, asking whether British telegrams should be forwarded to the Deutsche Seewarte in Hamburg, I am instructed that no communications with Germany, except on official matters, are yet permitted in this country. However, as soon as this policy has been withdrawn they will be sent freely.

Yours sincerely,
H. G. LYONS.

The Director,
Det Norske Meteorologiske Institut,
Kristiania.

Comité d'Action des Services Météorologiques Français (Minute 713).—Reported—the following letter :—

M.O. 856.

Le Secretaire Perpétuel de l'Academie des Sciences, Président du Comité d'Action des Services Météorologiques Français, à Monsieur le Directeur du Meteorological Office, South Kensington, London, S.W.

Comité d'Action des Services,
Météorologiques Français,
176, Rue de l'Université.

Paris,
le 16 Janvier, 1919.

MONSIEUR,

J'AI communiqué au mois de Septembre dernier à tous les Services Météorologiques des Nations Alliées le Code de Transmission, des Observations Météorologiques publié par le Comité d'Action des Services Météorologiques Français.

Ce Code a donné lieu à diverses observations, plusieurs Services ont fait remarquer que les messages rédigés suivant ce code ne présentaient pas le caractère secret qu'on doit exiger des renseignments Météorologiques en temps de guerre.

Les circonstances actuelles ont modifié les conditions du problème, et c'est pourquoi je vous propose de bien vouloir examiner à nouveau cette question.

J'estime qu'il y a lieu d'aboutir le plus tôt possible à une entente entre les Nations Alliées au sujet de l'établissement d'un Code de Transmission des Observations Météorologiques qui réponde à tous les besoins nouveaux, en particulier aux besoins des Services Aéronautiques. A cette question se rattache d'ailleurs l'envoi des radiotélégrammes Météorologiques et la reprise des relations internationales.

Je vous serais très obligé de me faire parvenir avant le 1er Mars, date à laquelle doit se reunir le Comité d'Action des Services Météorologiques Français, votre réponse sur toutes les questions, afin d'établir un programme de discussion pour une réunion Météorologique Interalliée, dont on pourrait envisager la convocation vers le milieu de l'année courante.

Veuillez agréer, Monsieur, l'assurance de ma haute considération.

Pour le Président du Comité d'Action
des Services Météorologiques Français,
Le Secrétaire Général,
J. ROUCH.

740. RECONSTRUCTION.—*Department of Scientific and Industrial Research* (Minute 731).— Read—the following letter from the Department of Scientific and Industrial Research in reply to a letter from the Meteorological Office asking for further particulars as to the proposals for the future of the Office:—

M.O. 976.—6718/18.

Department of Scientific and Industrial Research,
15, Great George Street,
Westminster, S.W. 1,
20th January, 1919.

SIR,

IN reply to your letter of the 6th December in which you informed me that the Meteorological Committee would be glad to learn what form of administration the Department of Scientific and Industrial Research propose for the Meteorological Office now administered by them I am directed to say that the broad outlines of organisation would be as follows :—

In the first place it is proposed that a new Advisory Council should be established to deal with the Geophysic Sciences. This Council would consist of probably seven or eight distinguished men of

science who would be responsible for advice to the Committee of Council on general questions of policy in regard to the Geophysic Sciences. The Council, which would be a sister body to the existing Advisory Council for Scientific and Industrial Research, would have attached to it assessors from all the Government Departments concerned in the work which falls within its purview. Connected with the work of the Council, but directly responsible to the Committee of Council would be a Board entrusted with the administration of the funds allocated on the Vote for the Geological Survey and Museum and another Board similarly responsible for the conduct of the Meteorological Office. In course of time further Boards may be established for the control of organisations dealing with other Geophysic Sciences.

The Meteorological Board would include amongst its members technical officers nominated by the Government Departments directly interested in meteorological work. It would probably consist of about the same number of persons as the present Meteorological Committee. The Director might or might not be Chairman of the Board. That would be a matter for further consideration. The Board would be expected to prepare a programme of work and estimate of cost each year for submission to the Committee of Council. This programme and estimate would go through the Geophysics Advisory Council and would be forwarded by them to the Committee of Council with any remarks they might see fit to make upon it. The Committee of Council would then be responsible for making such provision for the work of the Board on the estimates as they might see fit. The Board would make an Annual Report which would be similarly presented through the Advisory Council to the Committee of Council and would be published. It might no doubt continue to be presented to both Houses of Parliament if that were thought desirable. After transference to the Committee of Council it is contemplated that the Meteorological Office would be established in the neighbourhood of Whitehall and that provision in the new Offices would be made for officers of those Departments of State which are most closely concerned in meteorological work to be accommodated, so that any departmental sections for Meteorology which it might be thought desirable to maintain as distinct from the Central Service should be linked up with that service in the closest possible manner.

It will be clear from what has been said that the intention of the Committee of Council is that the functions of the Board of Meteorology should be to all intents and purposes identical with those now exercised by the Meteorological Committee but the funds at the disposal of the Board instead of being, as at present, a Grant-in-Aid would be provided as a sub-head on the Vote of the Research Department though it would be possible to arrange, if such a course proved desirable, that a Grant-in-Aid for special purposes might be placed at the disposal of the Board.

I am, &c.,
H. F. HEATH.

The Director,
Meteorological Office.

The Chairman submitted the following memorandum on a National Meteorological Institute :—

A NATIONAL METEOROLOGICAL INSTITUTE.

One of the requirements of an efficient meteorological organisation which must be borne in mind in considering the various proposals for reconstruction is the provision for the training of the professional staff. Training is required in the science of meteorology as well as the technique of meteorological practice, and includes instruction in the use of instruments, the discussion of observations, the nature and extent of available information and an introduction to meteorological literature. The meteorological requirements of aviation have emphasised the need for suitable training.

So far, except to a certain extent the Observatory at Ben Nevis the Meteorological Office has been the only institution in the country where training has been possible, though the process has never been fully organised. Before the war it was the practice for those who contemplated taking up meteorology as a career to spend some time at the Office under the guidance of the chief. This plan was followed in the case of Dr. G. T. Walker, Director General of Indian Observatories, Dr. G. C. Simpson, one of his principal assistants. Mr. H. E. Wood, who went out to Johannesburg as meteorological assistant, and subsequently J. S. Dines, now assistant superintendent of the Forecast Division, and H. W. Braby, graduate assistant up to the time of the war, joined as voluntary assistants.

The practice with regard to the supply of professional staff for the Office was to make an appointment as personal assistant to the head of the Office or as Superintendent of instruments, a post that had at the time very little administrative duty. In that way Mr. Lempfert, now Superintendent of the Forecast Division, Lieutenant-Colonel Gold, who was Superintendent of the Statistical Division before he took up work in France, Mr. Corless, Superintendent of the Instruments Division, and Mr. Whipple, now Superintendent of Statistics, were brought on to the staff. For the Marine Division an officer of the Royal Navy or the Mercantile Marine who had "made good" by contribution of original papers on meteorological subjects has been selected. Colonel Gold had further opportunities for an insight into the subject as the holder of the Readership in meteorology at Cambridge on Dr. Schuster's Foundation, the duties of which are mainly research in meteorology. Major Taylor qualified himself for meteorological work by the same appointment.

In 1905, in order to provide further opportunities for keeping the staff informed of the progress in meteorology, fortnightly discussions of important contributions to meteorological literature were arranged at the Office for the winter months, and these have been continued with marked success until the present winter.

In 1906, by arrangement with Sir Arthur Rücker, Principal of the University of London, an annual course of lectures was added. The lectures were given in rooms borrowed for the occasion.

We hold the premises of the present Office on lease from the Office of Works for 20 years from 1910. In the plans for the new Office provision was made for the educational side of the work by designing the Library to serve also as a Museum and Lecture Room, but the extension of the ordinary

work of the Office gradually encroached upon the space. At the same time the plan was started of appointing "professional assistants" on the staff of the Office and Observatories, with the preliminary qualifications of a degree in physics or applied mathematics and with the understanding that the necessary technical training would be afforded by the facilities which have been described. At the outbreak of war A. H R. Goldie (Captain), C. D. Stewart (Lieutenant), H. Billett (who was transferred to the Meteorological Service of South Africa and subsequently joined the Army and was killed) and L. H. G. Dines, now Superintendent at Cahirciveen (Valencia), were on the staff, and within the first year of the war E. V. Newnham, E. G. Bilham and C. E. P. Brooks, all now on duty in the Forecast Division, were appointed. More recently a considerable number of women graduates have been added.

During the war technical training was provided in advance for a number of Officers of the Meteorological Section, R.E., by enrolling suitable candidates as professional assistants with the prospect of recommendation for a commission, which was realised in every case. Subsequently a course of training was formulated for Officers of the Section and for other ranks. A considerable number of Officers of the Naval Air Service also attended for a short training in the Forecast Division, and a special arrrangement was made at the request of Lieut. Commander McAdie for a brief course of training for the Officers of the American Meteorological Service established in the United Kingdom. Hence it is clear that training in meteorology should be recognised as an important part of the work of the Office.

After the war, with the enlargement and multiplication of Meteorological Services, the need for organised provision for training will be felt even more strongly, and it is emphasised by the fact that, in arranging for a school of aëronautical sciences the Air Ministry and the Imperial College of Science look to the Meteorological Office for co-operation in respect of the meteorological side, the importance of which has recently been insisted upon by the Secretary of State for the Air Ministry. Such co-operation is at present an essential part of the programme, because outside the Office staff there is no class of persons with the requisite training and experience, but meantime the ordinary work of the Office has outgrown the available space. The Forecast Division has found temporary quarters in the top floor of the same building, and the Instrument Division in a separate house in Cromwell Road.

In other countries the dual requirements are definitely met by constituting a Meteorological Institute, which discharges the duties of a Weather Bureau on the one side and is in connexion with a university on the other. That is the case in Norway, Sweden, Denmark, Holland, Italy and Japan, which are pre-eminently associated with progress in meteorology as a science. It is not the case with France and America, where conspicuous meteorologists have been unofficial.

The idea of associating provision for scientific development with technical duties as part of the official scheme has been recognised in other establishments on similar footing, as in the Standards Bureau of Washington and in the National Physical Laboratory.

It is very important that in any reconstuction of the Office the facilities should be preserved and augmented.

The proposal of the Committee of the Cabinet for the transfer of the Office to the Department of Scientific and Industrial Research should be considered in connexion with our own proposals for the co-ordination of the activities of the Office with those of the special Services of the separate Departments. Satisfactory co-ordination would seem to require the concentration of the telegraphic work, the printing of reports, and a complete library of reference in one building in close proximity to the public offices. South Kensington is pronounced to be too far away, and in any case there is not room in the present building, even if the top floor were permanently available Also we may expect in time to have to provide for the work of the Rainfall Organisation, which would require another half floor, and the Investigation of Atmospheric Pollution, if it is continued, would require another half; so that the accommodation is deficient for prospective needs by the space represented by two floors and a half of the present building. That would mean approximately doubling the accommodation which the Office rents from the Office of Works.

At the same time South Kensington is much more suitable than Westminster for the Museum, and practice in the use of instruments, a workshop and laboratory, and other aspects of scientific training. It is also quite suitable as a model auxiliary establishment for the supply of information such as we may expect to see established in various local centres. It is therefore desirable to consider whether the functions of the Office as represented by the arrangements of 1910 should be divided into two sides, combined, however, in one National Meteorological Institute. The more technical duties with the library might be transferred to new quarters in Westminster and the present Office retained as a School of Meteorology for the training of the professional staff, for researches of a more special character, and for the preparation of the handbooks and manuals that cannot reasonably be carried out by those who are continually pressed by the current work of an Office.

Considering the pressure for space of any kind near the public offices the understanding might be to transfer only those parts of the work which require to be run in direct co-ordination with the other services, and this, as a temporary measure, is the more appropriate because it is very desirable that the accommodation for the work of forecasting, and for the arrangement of the statistical records should not be so restricted as it has been at South Kensington. I have, therefore, considered the division of the Office work on the lines indicated. It works out as follows :—

National Meteorological Institute.

A. Meteorological Office, S.W.1,	B. School of Meteorology, S.W.7.
Collecting Department :—	Museum and lecture room.
Forecast Division.	Special library.
Statistical Division (including Marine Meteorology).	Appliance for lectures and other educational purposes.
Library.	Workshop, laboratory.
Telegraphic receiving and transmitting station.	Lantern slides and diagrams.
Wireless receiving station.	Observatories—supervision of researches.
Organisation of stations.	Atmospheric pollution.

A. Meteorological Office, S.W.1.

Issue Department :—
Telegraphic issues.
Printing press.
Drawing Office.
Statistical Discussions, Reports, circulars and memoranda
Professional notes.
Issues to newspapers.
Inquiries.
Liaison with other departmental establishments and international exchanges.

B. School of Meteorology, S.W.7.

Auxiliary information centre as model of local establishment.
Observing station.
Training in meteorological methods and practice.
Issues. Accounts of special researches.
Text-books and hand-books.
Liaison with Imperial College of Science, School of Aviation and other educational centres, with international organisations for research.

C. To be assigned.

Rainfall Organisation.
Instruments.
Stock of Publications.
Administration and accounts.

In the special circumstances there are many advantages in this proposal. Future developments may make it desirable to have an adequate building in a central position for all the requirements of a National Institute. On the other hand the Educational establishments, which have not at present the experience to enable them to set up separate institutions of their own, may be guided in the future by arrangements tried at the Meteorological Office.

The plan of independent action has been tried in America where there is provision for training and research in Meteorology which is unconnected with the State Service, and it may fairly be said that their arrangement does not seem to have been as successful as our own extemporised efforts. But without prejudice to any final decision on the comparative merits of the two systems it seems desirable to carry on our own system during the transition period of the next few years with such improvements as are necessary to make both sides of the national undertaking reasonably efficient.

Meteorological Office,
January 15th, 1919.

NAPIER SHAW.

The Acting-Director submitted the following proposed cadre for the Meteorological Office:—

MEMORANDUM ON THE CADRE OF THE METEOROLOGICAL OFFICE.

One of the first steps in the reconstruction of the Meteorological Office will be to revise the Cadre which is no longer suited to requirements of the State Meteorological Service. The numbers are insufficient to carry out the work, the salaries are low, and the prospects are inadequate.

The present Cadre is as follows :—

Grade.	Salary.	1914.	1918. On Service.	M.O.
	£			
Director	800—1,000	1	—	1
Superintendents	350— 500	6	1	6
Assistant Superintendents	not fixed	—	—	1
Senior Professional Assistants	200— 330	11	1	13
Junior Professional Assistants	125— 200		—	—
Graduate Assistant	60	1	1	—
	—	19	4	29
Principal Asstistants	225— 275	5	—	6
Forecast Assistants	—	2	—	2
Staff Assistants	175— 200	7	1	13
Staff Clerks	125— 150	13	—	9
Clerk Assistants	75— 150	5	3	5
Clerk Computers	75— 100	11	5	8
Probationers	according to age	14	7	11
Boy and Girl Clerks		5	3	17
	—	62	19	71
Total		81	23	100

Thus it will be seen that the staff has increased from 81 to 100 during the War, and there are also 23 now on service, of whom the majority desire to return to their former work in the Meteorological Service. The work of the Meteorological Office has considerably increased in consequence of

the demands of aviation, and far from being reduced on the termination of hostilities large numbers of enquiries are being received from individuals and organisations who could not obtain meteorological information while restrictions were in force, or whose requirements have extended.

Aviation now demands that the continuous 24 hour forecasting service, which was established during the war, should be maintained; proposals for long flights; aerial transport, etc., require much information to be re-worked and new information prepared; it is understood that the Colonial Office may wish to utilise some of the Staff in connection with Colonial Meteorological Services; the War Office looks to the State Service to supply its wants both in peace and in time of war; the British Rainfall Organization is on the point of being taken over. The occasion is, therefore, opportune for the revision of the existing cadre.

The grades should be :—

* *Senior or Graduate Staff—*

	£	£	£	Years.
Assistant Director	700	20	900	10
Superintendents	480	20	650	8
Meteorologist 1st Grade	225	15	450	15
Meteorologists, 2nd Grade	150	10	210	6

* *Junior or Non-Graduate Staff.* (*Technical and Clerical.*)

	£	£ s.	£	Years.
Chief Assistants	325	10 0	400	7
Assistants, 1st Class	225	7 10	315	12
„ 2nd „	120	7 10	210	12
„ 3rd „	75	5 0	110	7
„ 4th „	Weekly pay.			

Printers, Draughtsmen, Instrument Mechanics on trade rates, Office Keepers, Messengers, Cleaners on weekly pay would form a Non-establishment Staff.

The foregoing Cadre is based on the assumption that men of University education and of 1st class ability should be able to reach a salary of £900, and in some cases more. The salaries quoted are on the present scale and would be subject to any revision that may in future be made of Civil Service salaries. The foregoing Cadre should also be entitled to pensions on Civil Service scale, since the Staff of other Meteorological Services are pensionable and the present position of the Meteorological Office Staff is a very real discouragement to well-qualified men who may consider it as a career.

The Meteorological Office is now divided into :—

(*a*) A Central Administration including the Central Registry, Accounts, and Library.
(*b*) Marine Division.
(*c*) Forecast Division.
(*d*) Statistical Division.
(*e*) Instruments Division.
(*f*) Seven Observatories.

The complete separation of the Meteorology of the Ocean areas from that of the land is due rather to the past history of the Meteorological Office than to any rational ground for such an arrangement. The introduction of aviation makes the retention of it impossible. The natural division of the work is between Short Period (Dynamical) Meteorology or weather, and Long Period (Statistical) Meteorology or climate; in both of these divisions the Meteorology of land areas and that of sea areas have to be studied together.

The following scheme seems, therefore, a preferable one :—

A.—Administration.		*B.—Weather.*		*C.—Climate.*		*D. Observatory.*
Central Registry.	Instruments and Stores.	Forecasts and Weather Reports.	Short Period Meteorology.	British Isles.	Long Period Forecast.	Richmond.
						Eskdalemuir.
Staff and Accounts.	Printing and Publication.	Gale Warnings.	Upper Air Investigation.	Colonies.	Climate Variation.	Valencia.
	Library and Inquiries.			Foreign.	Applied Meteorology.	Falmouth. Farnborough. Aberdeen.
	Special Staff *e.g.* for W.O.			Rainfall.		Benson.

* The scale of salaries was subsequently modified to be in accordance with that of the National Physical Laboratory The revised scale is as follows :—

	£	£	£
Senior or Graduate Staff :—			
Asst. Directors	800	50	1,000
Superintendents	650	25	750
Meteorologists I.	450	20	600
Meteorologists II.	250	20	430
Meteorologists III.	175	15	235
Junior or Non-Graduate Staff (*Technical and Clerical*) :—			
Chief Assistants	305	15	350
Assistants, 1st Class	200	10	290
„ 2nd Class	140	10	190
„ 3rd Class	85	£7 10*s.*	130
„ 4th Class		Weekly pay.	

The Staff necessary for carrying on the work of a State Meteorological Service in the British Isles, maintaining close relations with the Dominions and the Colonies of the Empire, as well as with foreign countries; and also being prepared to provide a meteorological staff and equipment in the event of hostilities is set out in the following tables :—

A.—Administration.

Grade.	Number.	Remarks.
Asst. Director...	1	
Superintendent	1 (1)	Instruments.
Meteorologist 1st G.	2 (3)	1 Library, 1 Publications.
„ 2nd G.	1 (3)	1 Instruments.
Chief Assistant	3	Chief Clerk, Accountant Insts.
Assistant 1st Class	4 (1)	2 Registry, 1 Accounts. 1 Instruments.
„ 2nd „	6 (3)	3 Registry, 1 Accounts. 2 Instruments.
„ 3rd „	10 (8)	7 Registry, 1 Accounts. 2 Instruments.
„ 4th „	10	8 Registry, 2 Instruments.

Numbers in brackets represent probable requirements of War Office in peace; Registry includes Library, Archives, charge of Records, and issue of Publications.

B.—Weather.

Grade.	Number.	Remarks.
Asst. Director	1	
Superintendent	2	
Meteorologist 1st G....	6	
„ 2nd G.	7	One with sea experience.
Chief Assistant	1	
Assistant 1st Class	3	
„ 2nd „	6	
„ 3rd „	6	
„ 4th „	6	

This allows for carrying a continuous 24-hour forecast service, as well as research into problems relating to Short-Period Meteorology. The Forecast Service requires :—

C.—Climate.

Grade.	Number.	Remarks.
Asst. Director	1	
Superintendent	3	2 for Routine work and for investigations, 1 for rainfall data.
Meteorologist 1st G.	3	1 for rainfall, 1 with sea experience.
„ 2nd G.	5	1 for rainfall, 1 with sea experience.
Chief Assistant	2	
Assistant 1st Class	4	
„ 2nd „	9	1 rainfall.
„ 3rd „	10	3 rainfall.
„ 4th „	10	

D.—Observatories.

Grade.	Number.	Remarks.
Asst. Director	2	2 Principal Observatories.
Superintendent	3	Kew, Valencia and Eskdalemuir.
Meteorologist 1st G.	7	One at each Observatory.
„ 2nd G.	7	„ „ „
Chief Assistant	—	
Assistant 1st Class	2	Kew and Eskdalemuir.
„ 2nd „	5	Each Observatory, except Falmouth and Farnborough.
„ 3rd „	14	2 at each.
„ 4th „	14	2 at each.

The proposed Cadre is therefore :—

Grade.	Salary.	A. Administration.	B. Weather.	C. Climate.	D. Observatories.	E.	Total.
	£						
Asst. Director	700–800	1	1	1	2		5
Superintendent	480–650	1 (1)	2	3	3		9 (1)
Meteorologists, 1st G. ...	225–450	2 (3)	6	3	7		18 (3)
„ 2nd G. ...	150–210	1 (3)	7	5	7		20 (3)
Chief Assistants	325–400	3	1	2	—		6
Assistant 1st Cl.	225–315	4 (1)	3	4	2		13 (1)
„ 2nd Cl.	120–210	6 (3)	6	9	5		26 (3)
„ 3rd Cl.	75–110	10 (18)	6	10	14		40 (18)
„ 4th Cl.	weekly wage.*	10	6	10	14		40
Total		39	38	47	54		178 (29)

The staff which is indicated in brackets is suggested as probably meeting army requirements, but this has not been discussed in detail.

The cost of this new Cadre estimated at the mean salary of each grade amounts to £35,341, against £20,135 which is now being paid (without War Bonus) or £23,155, when all those now on service have returned and have resumed their work at their present salaries.

The following reply to the Department of Scientific and Industrial Research submitted by the Chairman was approved for transmission to the Department :—

M.O. 2109.

Meteorological Office,
South Kensington, S.W.7,
12th February, 1919.

SIR,

YOUR letter No. 6718/18 dated 20th January, 1919, outlining the proposals of the Department for the future administration of the Meteorological Office, has been laid before the Meteorological Committee, and I am directed to reply as follows :—

1. At the present time, as a consequence of the experiences of war, the Meteorological Office is faced with largely increased requirements on the part of Government Departments and the general public : for which a considerable extension of activity is needed. Negotiations are also on foot for incorporating the British Rainfall Organization with the Office. Under its present scheme of administration the Office has passed through the stress of war with remarkable success, and the present arrangement under which the Office is controlled by a body directly responsible to the Treasury has proved itself both workable and useful. The Committee, therefore, view with some concern the more elaborate proposals of the Department for the administration of the Office. They have noted the omission of the Royal Society from the bodies mentioned as represented on the proposed Meteorological Board, and trust that the omission does not mean that the exclusion of the Society from its share on the controlling Board is contemplated.

2. They recognise that in the reconstruction called for by the expansion of the application of science in relation to government it is desirable for the various scientific establishments belonging to the State to be co-ordinated in one general scheme of administration, and they hope that it may be possible to arrange for this co-ordination without introducing statutory or other limitations of the controlling authorities that would hamper the work of the Office. They have, therefore, thought it best to outline in this letter the plans which they had in view for the work of the Office and its extension and the means with which they proposed to carry them out.

3. The activity of the Office is foreshadowed in a memorandum presented to the Ministry of Reconstruction in December, 1917. It sets out the following list of requirements which the Office had already been called upon to satisfy :—

For public administration : Information bearing upon :—
- Food supply.
- Water supply.
- Roads.
- Public health.
- Conditions of working in factories, &c.
- Law cases.

Navigation and transport :—
- By sea : weather conditions of sea routes.†
- By land.†
- By the air : weather conditions of air routes.†

Exploration : Supply of instruments and information : training of staff.

Agriculture and commerce (local and imperial) :—
Climatic conditions of various countries and their variations. Weather conditions.†

Engineering : Information bearing upon the working of engines at various levels in different parts of the world.

* Taken at £50 per annum.

† These services included forecasts of weather and the supply of information to local establishments as a general basis for local forecasts.

Naval and Military Services :—
Information as to climatic conditions of various theatres of naval, military and aerial warfare.
Information as to weather conditions of various theatres of naval, military and aerial warfare.
Information bearing upon gunnery.
" " " gas warfare.
" " " sound ranging.
" " " bombing.
Training of scientific and technical staff.
Supply of instruments.

4. The memorandum contemplated the extension and consolidation of the work of the Office in the near future by the incorporation of the work of the British Rainfall Organization, provision for the systematic organisation of observations under the Local Authorities of the United Kingdom, the Colonies and Protectorates and on the ships of the Mercantile Marine, the establishment of local depots for the distribution of meteorological information in Scotland, Ireland and the great seaports. The Committee had already represented to the Treasury the necessity for a Scotttish and an Irish Centre at a cost of about £1,000 a year each.

5. The proposed development of aviation and aerial transport includes the establishment of aerodromes at intervals along the main air routes, and for these it is certain that trained meteorological assistance will be required which must be represented by a local establishment of the kind indicated for Scotland and for Ireland. This assistance by whatever means the cost is provided must be available for private adventurers as well as for Government officials. Of these new establishments some may or may not be directly under the control of the Meteorological Office, but all of them will be dependent upon the Meteorological Office for some part of the training of the Officers, the selection and supply of books of reference and other details of organisation.

6. In order to provide for the work of the Office in 1919–20 estimates have been submitted for an expenditure of £61,189, of which £48,500 would fall upon Parliamentary votes (£47.000 M.O., £1,000 Royal Society, £500 Department of Scientific and Industrial Research); the remaining £12,639 was provided by "Appropriations in aid," of which £9,700 is estimated as payment for instruments supplied to the Services or private observers, £400 is provided by subventions from the Gassiot Trust and the Rosse Trust of the Royal Society for certain observatories, the rest represents charges made by the Office for services rendered to departments or to the public, or incidental expenses incurred on their behalf and refunded. The cost of stationery, printing and publications is borne on the vote of the Stationery Office and not included in the sum mentioned. Some additional expenditure of capital will be required in order to bring the accommodation and equipment of the observatories to the standard required by the conditions of the present day.

7. The information which the Office uses is supplied by—
The Office itself and 6 observatories included in its administration.
Two other observatories to which the Office makes subventions.
Some 40 observatories belonging to the Admiralty, the Air Ministry or the War Office.
25 telegraphic reporting stations receiving payments about £30 a year.
75 telegraphic reporting stations of foreign governments.
10 Weekly Weather Report stations receiving payments of £5 or £10 a year.
About 500 volunteer stations in the United Kingdom and the Colonies.

If the British Rainfall Organization is incorporated with the Office about 5,000 volunteer observers will be added. Before the war there were about 250 volunteer observers at sea, and this service will be presumably restored and extended.

8. Making an estimate of the cost of maintenance of these voluntary stations it would appear that about £45,000 provided privately is used for public meteorological purposes in addition to sums voted by Parliament. All told, the services for the public utility of which the Office is responsible may cost about £100,000 a year.

9. Information as to self-governing dominions and foreign countries is provided by a system of exchange of publications with official and private meteorological establishments in all parts of the world.

10. The observatories of the Office at Richmond and Eskdalemuir are *Physical* observatories not merely meteorological ; the primary purpose of that at Eskdalemuir is the investigation of terrestrial magnetism, in which also the observatories at Richmond and Cahirciveen (Valencia) co-operate. The Committee, therefore, does not regard the geophysical subjects as outside the scope of the work of the Office.

11. The staff employed directly by the Office for the maintenance of the work is about 160, of whom 29 have a professional training in meteorology or magnetism or seismology. It is proposed to put the provision for the staff on a satisfactory basis, to enlarge it to 207 inclusive of those required for the service of the War Office, and to introduce a new scale of payment and pensions which will offer a career for men of ability. The increase of charges represented thereby is about £11,000 per annum, of which about £8,000 is included in the estimates submitted to the Treasury.

12. The provision for training members of the staff is at present represented by facilities for lectures, discussions and other opportunities, in association with educational bodies or scientific societies for the advancement of meteorological or geophysical science and education, in addition to the technical training incidental to the ordinary work of the Office and its observatories.

13. It will be seen that the present scheme of the Office and its finance is based upon :—
1. A grant-in-aid by Government.
2. Subventions from the Royal Society or other bodies associated with formal advice on certain parts of the work, and access for informal advice upon any scientific question ;

3. Payment by private persons and in certain cases by public departments for services rendered;
4. Sale of instruments and publications;
5. Payment to the Post Office and in certain cases recovery of incidental expenses of postage and telegraphy;
6. The acceptance of voluntary services from observers on sea and land who receive recognition in the way of publications, facilities for acquiring instruments, &c.;
7. An organised exchange of publications with official and private institutions in all countries;
8. The facilities of a school of meteorological education and research as the basis of training in methods and practice.

14. With some exceptions the Office has been accustomed to pay the Post Office for postal, telegraphic and telephonic services at the rates chargeable to the public. It has also differed from the practice of the Civil Service in that the rules for superannuation and retiring allowances are within the discretion of the Committee subject to sanction by the Treasury.

15. The Committee contemplate close co-ordination between the work of the Office and the special meteorological services of the several departments, and they also contemplate arrangement with the Colonial Office for co-operation by inspection or otherwise in the organisation of the meteorological work of the Crown Colonies and Protectorates. Their first care is to make suitable provision for the pay and status of the professional and technical staff so that the service may not be hampered by inadequate prospects of a successful career.

16. The Committee would be glad to know (1) whether the rules of the Department would permit it to make provision for the continuance of the activities as set out herein, (2) whether the Department is prepared to support the very considerable extension of meteorological activity outlined in the foregoing paragraphs, which the Committee hold to be called for in the public interest, to promote the incorporation of the British Rainfall Organization with the Office, the establishment, in association with the office, of depots in Scotland, Ireland, the great ports and, if necessary, at some of the aerodromes on the great air routes and the provision of the staff necessary for the meteorological service of the War Office.

I am, &c.,
NAPIER SHAW.

The Secretary,
Department of Scientific and Industrial Research,
15, Great George Street, S.W.1.

The proposal for retaining the premises at South Kensington as a constituent element of a National Meteorological Institute was approved as a temporary measure.

It was agreed that the proposed cadre for the Meteorological Office with the revised scale of salaries should be reported at once to the Treasury, and the necessity for immediate action urged.

741. SUPPLY OF INFORMATION TO THE PRESS (Minute 729).—Reported—that applications for weather forecasts and maps had been received from the "Morning Post" (M.O. 16000/18 and M.O. 17130/18) and the "Times" (M.O. 01127/19) and that a room had been placed at the disposal of the Press correspondents.

With regard to the supply of information to the Press by the Office Staff it was agreed that full reports should be got out as early as possible and every facility given to newspaper correspondents, but that no work should be done by the Office Staff for the Press during Office hours.

742. OFFICE STAFF.—**Extra Leave.**—Reported—the following Treasury letter:—

M.O. 1147.—44937/18.

Treasury Chambers,
12th December, 1918.

SIR,

I AM directed by the Lords Commissioners of His Majesty's Treasury to inform you that Their Lordships have had under consideration a proposal that, in view of the heavy pressure of work which has fallen on Civil Servants during the War, an extension of annual leave should be granted during the year 1919; and that the following arrangements have been approved by His Majesty's Government.

During the calendar year 1919 an extra week's leave with pay will, subject to the requirements of the Public Service, be granted to such permanent employees of Government Departments (including men returning from the colours) as are entitled under existing regulations to a period of ordinary leave with pay.

Subject to the like requirements temporary staff who are in employment on the 1st January next and have been employed for at least a year in one or more Government Departments may be allowed two days' extra leave with pay for each year of service with a maximum of six days' in all. Broken periods of service may be included at the discretion of the Heads of Departments.

My Lords desire to place on record Their appreciation of the public spirit with which Civil Servants, both permanent and temporary, have responded to the demands made by the existence of a state of War, in many cases sacrificing a considerable amount of their normal holiday.

I am, &c.,
T. L. HEATH.

It was agreed that extra leave should be granted to the Office Staff on the same terms as to permanent Civil Servants.

The following order was approved :—

The Meteorological Committee desire to place on record their appreciation of the work done by the Staff of the Meteorological Office during the four-and-a-half years of the European War, of the high standard which has been maintained, and of the manner in which difficulties have been overcome.

Decorations.—Reported—that the Order of the British Empire O.B.E. had been conferred on the following: Lieut. Col. Gold, Capt. Wedderburn, and Capt. Kidson (Military Division) and Mr. R. Corless (Civil Division).

Mentioned in Despatches.—Reported—the following from the "London Gazette," 23rd December, 1918, Lieut. Col. Gold, Capt. A. M. Geddes, Capt. A. H. R. Goldie, Sergt. E. L. Clinch.

Resignations.—Miss G. D. Little (Minute 708)—Reported—that the resignation of Miss G. D. Little, Junior Professional Assistant in the Forecast Division, had been accepted as from 12th January, 1919.

R. E. Watson. (Minute 709)—Reported—that the resignation of Mr. R. E. Watson, Senior Professional Assistant at Falmouth had been accepted, the date of the termination of the appointment to be settled at a future date.

Dismissal.—E. West. (Minute 646)—Reported—that E. West, Office Boy and Messenger, had been dismissed from the Office as from 8th January.

New Appointments.—Reported—the following Director's Orders for Confirmation :—

Order 783 appointing **Miss I. M. Brierley** (Minute 667) as Typist at the Meteorological Office, South Farnborough, at a salary of £2 per week. The appointment to date from 28th November, 1918.

Order 787 appointing **C. Griffin**, Office Boy and Messenger, with wages of 14*s.* a week and war bonus. The appointment to date from January 7th, 1919.

Approved.

Sick Leave.—Captain Hepworth.—Reported—that Captain Hepworth had been absent from the Office on sick leave since 19th November, 1918, but expected to return to the Office in about a fortnight's time.

Promotion.—Recommended—that **Miss E. H. Geake** (Minute 654), Junior Professional Assistant in the Instruments Division, be promoted to Senior Professional Assistant, with a salary of £225 per annum and war bonus as from 1st February, 1919.

Approved.

Returned from Service.—Reported—that the following had returned to the office on demobilisation:—C. E. Goad, (Minute 723) Senior Office Keeper, on January 1st, 1919. F. W. Creek (Minute 552) on January 27th, 1919.

Obituary.—W. Allingham.—Reported—that W. Allingham, Principal Assistant in the Marine Division, died on his way to the Office on Friday, January 24th, and that Mr. Donald Macleod, Son-in-law, had called to represent that Mrs. Allingham was in very straitened circumstances, and to request that provision should be made for her by the Office.

In view of the fact that Civil Servants were now allowed to commute part of their pension, it was agreed that inquiry should be made of the Treasury to ascertain what discretion the Committee had in the matter of making a compassionate allowance.

743. Forecast Division.—**Issue of Forecasts to the Public** (Minute 727)—Reported—that the issue of forecasts was resumed on 18th November.

Discontinuance of Telegrams from H. B. M. Consuls at Thorshavn and Reykjavik (Minute 504).—Reported—that the special service of telegrams from Thorshavn and Reykjavik had been discontinued in consequence of the re-establishment of the international meteorological reports from Iceland and Faröe as from 1st January, 1919. (M.O. 507/19 and 598/19).

Special London Forecast.—Reported—that in order to comply with a request received from the Press Association the numbering of the forecast districts had been modified as follows:—

1. South-eastern England	London area, Kent, Surrey, Sussex, Berks, Hants, Wilts.
2. Eastern England	Lincoln, Norfolk, Suffolk, Cambs., Huntingdon, Beds, Herts, Essex, Middlesex.
3. Eastern Midlands	Notts, Leicester, Rutland, Northants, Warwick, Oxford, Bucks.
4. Western Midlands	Stafford, Salop, Worcester, Hereford, Gloucester.
5. South-western England	Monmouth, Somerset, Dorset, Devon, Cornwall.
6. South Wales	Radnor, Cardigan, Pembroke, Carmarthen, Brecknock, Glamorgan.
7. North Wales	Flint, Anglesey, Carnarvon, Denbigh, Merioneth, Montgomery.
8. North-western England	Cumberland, Westmorland, Lancashire, Cheshire.
9. Northen Midlands	Yorks (West Riding), Derby.
10. North-eastern England	Northumberland, Durham, Yorks (N. and E. Ridings).
11. Eastern Scotland	Nairn, Elgin, Banff, Aberdeen, Kincardine, Forfar, Perth, Fife, Clackmannan, Kinross, Linlithgow, Edinburgh, Haddington, Berwick, Peebles, Selkirk, Roxburgh.
12. South-western Scotland	Bute, Dumbarton, Stirling, Renfrew, Lanark, Ayr, Dumfries, Kirkcudbright, Wigtown.
13. Isle of Man	
14. North and north-western Scotland	Caithness, Sutherland, Ross and Cromarty, Inverness, Argyll.
15. Western Hebrides	
16. Orkney and Shetland	
17. North-western Ireland	Leitrim, Sligo, Roscommon, Mayo, Galway.
18. North-eastern Ireland	Donegal, Londonderry, Antrim, Tyrone, Down, Armagh, Monaghan, Formanagh, Cavan, Longford, Westmeath, Meath, Louth.
19. South-eastern Ireland	Dublin, Wicklow, Kildare, King's Co., Queen's Co., Kilkenny, Carlow, Wexford, Waterford.
20. South-western Ireland	Tipperary, Clare, Limerick, Kerry, Cork.

Hartland Quay Station Closed. (Minute 660)—Reported—that owing to the cessation of hostilities the volunteer observer at Hartland Quay no longer wished to continue observations (M.O. 17767) and that the station had been closed in consequence.

Remuneration of Observer at Oban.—Reported—that a request had been received from the observer at Oban asking for increased remuneration. (M.O. 5269/18).

It was agreed to increase the remuneration by 50 per cent. to date from 1st August, 1918, until the cessation of the reports on 14th January, 1919.

Reports from Health-Resorts. (Minute 693)—Reported—that the issue to the newspapers of the daily schedule of meteorological reports from Health Resorts was to be resumed on January 31st, subject to the same conditions as previously.

744. Marine Division.—**Issue of Pilot Charts to Mercantile Marine.**—A recommendation to issue Meteorological Charts of the Atlantic and Indian Oceans free of charge from the Mercantile Marine Offices in the case of the Atlantic to all Foreign going vessels, and in the case of those of the Indian Ocean to all Foreign going vessels proceeding to the Indian Ocean was approved.

It was agreed that the issues might be in atlas form, with a monthly supplement, instead of repeating the issue of the complete chart each month.

745. Publications (M.O. 234).—**Manual of Meteorology** (Minute 735)—Reported—that 307 'advance copies' of Part IV of the Manual of Meteorology had been received from the Cambridge University Press at a charge of the estimated cost of working and stitching.

746. Directors' Report and Accounts:—

Reported—a meeting took place at the Meteorological Office on 16th and 17th December, 1918, of representatives of the Meteorological Office, the Admiralty Meteorological Service, the Meteorological Section R.E., the Meteorological Service R.A.F., and the Service Météorologique Militaire Français.

The question of the transmission of international reports by wireless telegraphy was discussed, and a request was transmitted to the Wireless Board that the matter might be considered at the next Conference on Wireless Telegraphy.

It was agreed that as soon as should be practicable reports from a selection of stations in each country should be sent out by wireless telegraphy one and a half hours after the hour of observation.

The question of the code to be used for transmission of meteorological reports was considered, and it was agreed that additional information concerning clouds, humidity and visibility was now necessary.

A proposal was made that the form of Daily Weather Reports should be more uniform in different countries and that the data for each day could be filed together for future reference and study.

Reported—the Wireless Board has agreed to take up the question of the international exchange of meteorological reports at probably the next meeting of the Inter-allied Conference on Wireless Telegraphy.

Reported—that the total value of instruments, &c., ordered but not delivered on 31st December, 1918, was £18,354. The total value of instruments and stores in store on 31st December, 1918, was £7,970. The total sum due for instruments and stores supplied up to 28th January, 1919, was £3,600. Bills awaiting payment 28th January, 1919, £6,430.

That steps had been taken to reduce as far as possible the quantity of stores and instruments on order as soon as the Armistice was declared.

Accounts.—Submitted—the following statement of the Bank Account in the Cash Book:—

	£	s.	d.
Balance on 3rd December, 1918	969	13	5
Receipts from 4th December, 1918, to 28th January, 1919	12,802	19	10
	13,772	13	3
Cheques drawn from 4th December, 1918, to 28th January, 1919 ...	10,315	6	1
Bank Balance on 28th January, 1919	£3,457	7	2

Submitted—The following Statement of Accounts for the Nine months ended 31st December, 1918, prepared for audit by the Comptroller and Auditor-General :—

RECEIPTS.						PAYMENTS.				
1917. £ s. d.		£ s. d.		1918. £ s. d.		1917. £ s. d.		£ s. d.		1918. £ s. d.
2,047 13 5	Balance from year 1917–18	—		99 14 10		—	Advisor	—		706 13 4
16,875 0 0	Parliamentary vote.	—		24,125 0 0		750 0 0	Directors— Sir Napier Shaw ...	83 6 8	}	190 16 8
	DEPARTMENTAL EXPENSES REPAID:						Col. H. G. Lyons ...	107 10 0		
1 13 0	Forecasts, &c. ...	8 7 0					OFFICE SALARIES (including Insurance):			
50 16 8	Marine, Statistical, and Administrative	70 5 5				8,443 8 8	Monthly	10,744 14 8		
241 19 2	Instruments ...	1,182 6 5		1,260 18 10		1,567 11 1	Weekly	2,382 13 2		13,127 7 10
	INCIDENTAL EXPENSES REPAID:					518 12 8	EXPENSES OF OFFICE: Rent, Heating, and Lighting	522 14 9		
71 1 5	D.W. Report ...	362 5 9				33 3 2	Furniture and Equipment	44 7 9		
51 13 6	Divisional... ...	162 5 9				17 4 0	Library	12 5 4		
7 13 11	Advertising Account	14 5 3				3 18 9	Insurances & Repairs	41 5 4		
				538 16 9		162 12 1	Incidental Expenses and Consumable Stores	333 9 7		
66 5 5	STATIONERY OFFICE	—		94 18 0		5 12 6	Advertising Account...	3 15 0		957 17 9
1,619 14 3	TELEGRAPH CHARGES REPAID	—		124 18 1		484 6 11	POST OFFICE: Postage	974 1 11		
						102 7 7	Telephones	228 7 6		
1 11 11	TELEPHONE CHARGES REPAID	—		115 0 4		3,020 13 0	Telegrams	2,899 11 11		
										4,102 1 4
106 9 6	INSPECTIONS ...	—		31 19 9		64 1 4	STATIONERY OFFICE...	—		96 0 8
	INSTRUMENTS:					113 13 2	TRAVELLING EXPENSES	—		196 9 9
2,418 19 7	Royal Navy ...	608 11 4					SUPERANNUATION:			
3,523 9 6	By sales from Stock	22,532 7 9				18 15 0	Pensions not chargeable on Fund ...	18 15 0		
				23,140 19 1		206 14 0	Pensions chargeable on Fund	99 1 6		
	SUPERANNUATION ACCOUNT:									
421 17 6	Annuities	406 17 6				421 17 6	Annuities	399 7 6		
46 2 5	Interest on Investments	49 19 4				—	Contribution to fund	—		
				456 16 10						517 4 0
	*OBSERVATORIES, BRANCHES, AND STATIONS:					2,404 12 7	COST OF INSTRUMENTS: Royal Navy	1,776 9 4		
						5,254 11 4	For Stock	21,361 10 9		23,138 0 1
342 15 7	Richmond ...	456 7 7					*OBSERVATORIES, BRANCHES, AND STATIONS:			
1,014 4 2	Eskdalemuir ...	1,017 12 4				1,657 0 10	Richmond	1,867 13 8		
21 11 0	Cahirciveen ...	25 18 0				1,234 16 8	Eskdalemuir	1,486 1 6		
305 10 9	Farnborough ...	27 2 11				553 3 9	Cahirciveen	780 10 2		
10 14 4	Falmouth... ...	11 4 0				386 13 3	Farnborough ...	636 5 3		
—	Benson	—				258 1 6	Falmouth	462 19 4		
—	Edinburgh ...	—				413 18 9	Benson	421 11 8		
500 0 0	Committee for Atmospheric Pollution ...	400 0 0				277 2 3	Edinburgh	322 17 3		
88 17 5	Miscellaneous ...	141 2 3				142 18 6	Committee on Atmospheric Pollution	229 4 5		
				2,079 7 1		1,046 11 4	Miscellaneous ...	1,375 8 8		
—	National War Bonds	—		3 0 0						7,582 11 11
2 12 6	Fire Insurance Claim	—		—		—	Balance on April 1st, 1918	—		1,221 12 1
29,838 6 11						29,564 2 2				
96 8 0	*Less* War Loan Subscription	—		—		17 0 0	*Less* National War Loan Subscription..	—		—
						29,547 2 2				
							BALANCE:			
						100 19 2	Cash at Bank ...	103 1 7		
						93 17 7	„ at Office ...	131 12 7		
										234 14 2
£29,741 18 11				£52,071 9 7		£29,741 18 11				£52,071 9 7

* For details, see separate statement.

Statement of Assets and Liabilities at 31st December, 1918.

LIABILITIES.				ASSETS.			
£ s. d.		£ s. d.		£ s. d.		£ s. d.	
5,451 15 10	To sundry creditors	9,063 14 9		194 16 9	By cash at Bank and at Office ...	234 14 2	
357 18 6	„ superannuation	1,226 8 6		11 8 1	„ salaries reserved (premiums) ...	8 18 2	
2,695 3 3	„ balance	1,131 0 4		2,502 6 0	„ M.O. instruments in stock ...	7,970 0 10	
				2,494 2 0	„ sundry debtors	2,005 17 9	
				3,302 4 9	„ Admiralty	1,201 12 8	
£8,504 17 7		£11,421 3 7		£8,504 17 7		£11,421 3 7	

NOTE.—On 31st December the amount of Government securities held for the provision of Superannuation Annuities was £26 14s. 2d. 2½ per cent. Consols, and £999 9s. 6d 5 per cent. War Loan.

Observatories.—Statement of Accounts for the nine months ended 31st December, 1918 :—

RICHMOND.

1917.	*Receipts.*	1918.	1917.	*Payments.*		1918.
£ s. d.		£ s. d.	£ s. d.		£ s. d.	£ s. d.
82 0 0	Subventions, Scott Antarctic Fund	—	1,381 16 6	Salaries, Scheduled	1,544 8 7	
225 12 2	„ Gassiot Trust ...	338 12 9	35 8 3	Sunday and holiday duty	24 6 6	
4 16 0	Expenses refunded locally ...	96 16 7				1,568 15 1
3 3 7	Tests and Commissions	7 14 6	17 19 5	Cost of forms, &c.		81 9 7
27 3 10	Cost of books and forms refunded	13 3 9	27 12 6	Rent, Rates, Taxes, Repairs and Insurance		37 1 5
1,314 5 3	Balance	1,411 6 1	63 13 6	Fuel and lighting		64 0 6
			40 3 9	Equipment and instruments ...		8 18 9
			44 6 5	Consumable stores		51 6 1
			12 14 11	Incidental expenses		10 11 1
			3 7 0	Books, &c.		4 9 0
			29 18 7	Postage, telephones and telegrams		36 2 10
			—	Travelling expenses		4 19 4
£1,657 0 10		£1,867 13 8	£1,657 0 10			£1,867 13 8

ESKDALEMUIR.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
1,000 0 0	Subvention, Royal Society ...	1,000 0 0	856 10 4	Salaries, Scheduled	1,099 15 3
14 4 2	Expenses refunded locally ...	17 12 4	43 15 8	Cost of forms, &c.	10 3
229 12 6	Balance	468 9 2	13 0 7	Rent, Rates, Taxes, Repairs and Insurance	13 16 10
			183 6 8	Fuel and lighting	203 19 4
			26 6 4	Equipment and instruments ...	6 18 10
			16 1 7	Consumable stores...	19 0 3
			4 9 3	Incidental expenses	10 14 1
			3 9 0	Books, &c.	14 16 3
			36 15 10	Postage, telephones and telegrams	35 13 7
			51 1 5	Travelling and motor car expenses	80 16 10
£1,234 16 8		£1,486 1 6	£1,234 16 8		£1,486 1 6

CAHIRCIVEEN.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
—	Subventions (Rosse Fund) ...	4 10 0	420 3 5	Salaries, Scheduled	646 5 4
21 11 0	Expenses refunded locally ...	21 8 0	2 9 7	Cost of forms	2 10 5
531 12 9	Balance	754 12 2	52 19 1	Rent, Rates, Taxes, Repairs and Insurance	46 9 9
			17 18 8	Fuel and lighting	23 12 0
			9 14 4	Equipment and instruments ...	7 18 9
			24 19 0	Consumable stores	8 6 4
			3 14 7	Incidental expenses	13 8 0
			1 8 0	Books, &c.	11 0 8
			19 10 1	Postage, telephones and telegrams	20 11 5
			7 0	Travelling expenses	7 6
£553 3 9		£780 10 2	£553 3 9		£780 10 2

FARNBOROUGH BRANCH OFFICE.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
250 0 0	Subvention (Advisory Committee for Aeronautics)	—	208 1 9	Salaries, Scheduled	509 6 3
—	Expenses refunded locally.... ...	4 5	3 0	Cost of forms	—
55 10 9	„ „ (War Office) ...	26 18 6	18 6 4	Rent, Rates, Taxes, Repairs and Insurance	6 4
81 2 6	Balance	609 2 4	20 4 5	Equipment and instruments ...	45 0 2
			73 7 3	Consumable stores...	11 7
			4 15 3	Incidental expenses	20 8 8
			1 8 0	Books, &c.	2 5 6
			41 0 10	Postage, telephones and telegrams	52 16 1
			19 6 5	Travelling and motor car expenses	5 10 8
£386 13 3		£636 5 3	£386 13 3		£636 5 3

FALMOUTH WEATHER STATION.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
10 14 4	Expenses refunded locally... ...	11 4 0	30 0 0	R. Cornwall Polytechnic Society	30 0 0
247 7 2	Balance	451 15 4	153 5 9	Salaries, Scheduled	346 9 7
			30 2 10	Rent, Rates, Taxes, Repairs and Insurance	28 16 2
			—	Equipment and instruments ...	6
			2 6	Consumable stores	5 11
			13 1	Incidental expenses	10 5
			—	Books, &c.	17 6
			43 14 4	Postage, telephones and telegrams	53 17 4
			3 0	Travelling expenses	2 1 11
£258 1 6		£462 19 4	£258 1 6		£462 19 4

BENSON.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
—	Expenses refunded locally ...	—	337 10 3	Salaries, Scheduled...	357 4 2
413 18 9	Balance	421 11 8	1 13 6	Overtime, &c.	—
			—	Cost of forms, &c.	—
			—	Rent, Rates, Taxes, Repairs and Insurance	—
			3 5 0	Fuel and lighting	10 0
			—	Equipment and instruments ...	4 6 3
			48 10 0	Consumable stores	38 17 9
			1 5 4	Incidental expenses	1 9 6
			10 6	Books, &c.	17 6
			21 4 2	Postage, telephones and telegrams	17 0 1
			—	Travelling expenses	1 6 11
£413 18 9		£421 11 8	£413 18 9		£421 11 8

Meteorological Office, Edinburgh.

1917. £ s. d.	Receipts.	1918. £ s. d.	1917. £ s. d.	Payments.	1918. £ s. d.
277 2 5	Balance	322 17 3	262 10 0	Subvention	307 10 0
			14 12 3	Travelling expenses	15 7 3
£277 2 3		£322 17 3	£277 2 3		£322 17 3

Adv. Com. Atmos. Pollution.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
500 0 0	Subvention	400 0 0	110 11 4	Salaries, Scheduled...	75 0 0
	* Balance for 1917-18	208 15 3	—	Overtime, &c...	30 9 8
			11 10 3	Equipment and instruments ...	9 1
			6 19 10	Consumable stores	2 1 0
			12 7 9	Incidental expenses (including printing of report for 1916–7)	117 11 2
			—	Books, &c.	3 13 6
			1 9 4	Postage, telephones and telegrams	—
			357 1 6	Balance	379 10 10
£500 0 0		£608 15 3	£500 0 0		£608 15 3

Miscellaneous Stations.

£ s. d.		£ s. d.	£ s. d.		£ s. d.	£ s. d.
—	Tests and commissions	6 10 0		Subventions—		
—	Expenses refunded locally ...	6 15 0	258 7 6	Aberdeen, Armagh...	258 7 6	
88 17 5	Cost of forms refunded	127 17 3	42 10 0	British Rainfall Organisation ...	42 10 0	
957 13 11	Balance	1,234 6 5				300 17 6
			601 16 6	Salaries of Observers (40) ...		725 18 3
			108 9 0	Cost of forms, &c.		297 10 3
			2 9 5	Rent, Rates, Taxes, Repairs and Insurance		7 1 5
			1 0 9	Fuel and lighting		—
			—	Equipment and instruments ..		4 2 6
			—	Consumable stores		—
			12 6 6	Incidental expenses, &c.		15 8 5
			3 19 8	Books, &c.		17 6
			15 12 0	Postage, telephones and telegrams		23 12 10
£1,046 11 4		£1,375 8 8	£1,046 11 4			£1,375 8 8

Meteorological Field Service.

France.

£ s. d.		£ s. d.	£ s. d.		£ s. d.	£ s. d.
1,160 15 5	War Office	3,752 10 2		Salaries :		
433 17 5	Balance	—	43 15 0	Lt.-Col. E. Gold ...	35 18 8	
			—	Capt. A. H. R. Goldie	—	
			—	Lieut. E. H. Chapman	—	
			—	Lieut C. D. Stewart	—	
			23 1 4	Sergt. R. Pyser ...	10 7 5	
			25 7 0	Sergt. E. L. Clinch	15 6 0	
			53 10 10	Corpl. A. G. Goad ...	45 0 4	
			25 11 8	Corpl. C. F. J. Jestico	15 6 0	
			19 16 6	Sergt. R. M. Poulter	6 16 0	
			191 2 4		128 14 5	
			2 11 0	Salaries refunded ...	22 19 11	
			188 11 4			105 14 6
				Incidental Expenses :		
			19 14 1	Postage	16 4 0	
			—	Telegrams ...	—	
			—	Printed books ...	—	
			7 5	Miscellaneous ...	—	
						16 4 0
			1,386 0 0	Instruments		3,044 5 11
			—	Balance		536 5 9
£1,594 12 10		£3,752 10 2	£1,594 12 10			£3,752 10 2

Dardanelles.

£ s. d.		£ s. d.	£ s. d.		£ s. d.	£ s. d.
318 17 0	Admiralty	—		Salaries :		
1,369 12 9	War Office	622 17 6	23 17 0	Sergt. C. V. Ockenden		11 0 6
—	Balance	727 11 5		Incidental Expenses :		
			13 18 4	Postage	4 10 5	
			1,273 16 4	Telegrams ...	755 12 3	
			—	Printed books ...	—	
			—	Miscellaneous ...	—	
						760 2 8
			227 4 10	Instruments		579 5 9
			149 13 3	Balance		—
£1,688 9 9		£1,350 8 11	£1,688 9 9			£1,350 8 11

Home Section.

£ s. d.		£ s. d.	£ s. d.		£ s. d.	£ s. d.
—	War Office	867 11 0		Salaries :		
—	Balance	88 16 5	—	Pioneer C. E. Goad ...	6 9	
			—	,, W. R. Penfold	—	
			—	Sapper W. J. Fowler	9 11 6	
			—	Pioneer A. H. Lupton	—	
						9 18 3
			—	Instruments		946 9 2
£ —		£956 7 5	£ —			£956 7 5

* The balance from the year 1917–18 for which the Office is accountable to the Department of Scientific and Industrial Research was omitted from the statement for 3 months (Minute 727) and for 6 months (*ibid.*).

NINETY-FIRST MEETING.

South Kensington, S.W.7., 12th March, 1919.

PRESENT:

SIR NAPIER SHAW, IN THE CHAIR.

CAPTAIN HARVEY.	SIR THOMAS MIDDLETON.
COLONEL LYONS.	DR. SCHUSTER.

747. The Minutes 738–746 of the Meeting of 29th January, 1919, previously circulated, were taken as read and confirmed.

748. OBITUARY.—Reported—the death, at his residence 2, Amherst Road, Ealing, on 25th February, 1919, of Captain Melville Willis Campbell Hepworth, C.B., R.D., R.N.R., Superintendent of the Marine Division since 1899 (Minute 32, 1900).

It was agreed to send a letter of condolence, on behalf of the Committee, to his sister Miss Juliet C. Hepworth.

749. THE RELATION OF THE OFFICE TO THE GOVERNMENT.—Reported—that in accordance with the decision of Minute 740 the Chairman, at an interview with Sir Thomas Heath, had submitted to the Treasury the following memorandum on the Cadre for the State Meteorological Service with covering letter M.O. 1487 :—

MEMORANDUM.

The Meteorological Committee had under consideration at their last meeting the Cadre necessary for the proper working of the State Meteorological Service, and the salaries which should be paid to the Staff. They came to the conclusion that these need considerable revision forthwith if the work of the Service is to be carried on.

Taking first the Senior or Graduate Staff the present scale of posts and salaries is shown in the following table, in which is included the number serving before the War and at the present time.

Grade.	Salary.	1914.	1918. On service.	M.O.
Superintendents	£350–550	6	1	6
Assistant-Superintendents...	Not fixed	—	—	1
Senior Professional Assistants	£200–300	11	1	13
Junior Professional Assistants	£125–200		1	8
Graduate Assistant	£60	1	1	—
		18	4	28

The existing posts offer wholly inadequate remuneration for the class of scientific man who is required in the service, and whose work has given proof of its value in the Meteorological Section, which has been employed on service on all the fronts during the past four years.

The type of man required is practically the same as that employed by the National Physical Laboratory and the Committee recommend that the same scale of salaries as has been recently adopted for the Laboratory by the Department of scientific and Industrial Research should be authorised from the commencement of the financial year 1919–20. This scale would be :—

	£	£	£
Assistant Directors	800	50	1,000
Superintendents	650	25	750
Meteorologists (1)	450	20	600
„ (2)	250	20	430
„ (3)	175	15	235

The War Office has requested the State Meteorological Service to provide the personnel &c. for all military requirements, considering this a more economical and more efficient scheme than maintaining a small technical military unit in which no career would be open to scientific men of ability.

This makes the prompt decision the more urgent for members of the present staff, and also those officers and men who have been serving for two or three years in the Meteorological Section, R.E. but desire to enter the Meteorological Service, are enquiring for openings where the prospects are better. In the Meteorological Office they can only look to £330 per annum, since all the Superintendents but two are comparatively young men ; also no pensions are provided. If these men do find more remunerative careers elsewhere, as seems extremely probable, the State Service will virtually cease to exist as no men are being trained in the subject outside the Service itself, and consequently the number of those who may be called Professional Meteorologists does not reach the total that this Office actually requires for its current work, unless these remain in or enter its service, the work cannot be continued.

On the new scale proposed the immediate requirements of the War Office can be met by—

	£		£
4 Meteorologists Grade II at	250	—	1,000
1 Meteorologist „ III „	175	—	175
2 Assistants 1st Class „	200	—	400
5 „ 2nd „ „	140	—	700
9 „ 3rd „ „	85	—	765
			£3,040

but as these are taken at the minimum of each class, the cost would be between this total and the mean of each grade, *i.e.* £4,192, to which £250 should be added for minor expenses connected with the establishment of the work on Artillery Ranges, &c.

The present requirements of the Meteorological Office are set out under the main divisions of work in the following table, and these are sufficient to meet the work which it is now being called upon to do. Many inquiries and investigations of urgency and practical importance have been awaiting the Staff to deal with them for months past, and the increasing demands of aviation and of the public render it impossible to put them in hand.

Proposed staff of the Meteorological Office.

Grade.	Administration.	Weather.	Climate, etc.*	Observatories.	W.O. work.†	Total.
Assistant Directors	1	1	1	2	—	5
Superintendents...	1	2	2	2	—	7
Meteorologists (Grade I) ...	1	4	2 (1)	4	—	11
„ („ II) ...	1	6	3 (1)	6	4	20
„ („ III) ...	1	3	3 (1)	5	1	13
Totals.	5	16	11	19	5	56

Junior Staff.—The grades adopted by the Department of Scientific and Industrial Research for the National Physical Laboratory's observers and clerical staff would be suitable for the Meteorological Office also. The present staff and their salaries are shown in the following table :—

Grade.	Salary.	1914.	1918. On service.	M.O.
Principal Assistants	£225–275	5	—	6
Forecast „	—	2	—	2
Staff „	£175–200	7	1	13
Staff Clerks	£125–150	13	—	9
Clerk Assistants	£75–150	5	3	5
Clerk Computers	£75–110	11	5	8
Probationers	According to age.	14	7	11
Boy and Girl Clerks	According to age.	5	3	17
		62	19	71

The proposed cadre would be :—

Junior or Non-Graduate Staff (Technical and Clerical).

	£	£ s.	£
Chief Assistants	305	15 0	350
Assistants, 1st Class...	200	10 0	290
„ 2nd „	140	10 0	190
„ 3rd „	85	7 10	130
„ 4th „	Weekly pay.		

* The inclusion of the British Rainfall Organization which is under consideration would increase the numbers in this column by the figures in brackets.

† Immediate requirements only.

The establishment which is required is given in the following table in which no provision is made for future requirements for military purposes nor for the British Rainfall Organization :—

Grade.	Administration.	Weather.	Climate.	Observatories.	War Office.*	Total.
Chief Assistants	3	1	2	—	—	6
Assistants, 1st Class	4	3	4	2	2	15
„ 2nd „	6	6	8	5	5	30
„ 3rd „	10	6	10	14	9	49
„ 4th „	10	6	10	14	—	40
	33	22	34	35	16	140

The Committee consider that provision should be made for pensions or for an endowment scheme. In any case the annual premiums required for the latter scheme should be additional to the salaries scheduled in the foregoing tables.

Meteorological Office, S.W. 7.
30th January, 1919.

Reported also—that as a result of the interview the following correspondence had been exchanged :—

M.O. 1,613.—4926/19.

Treasury Chambers,
1st February, 1919.

SIR,

I HAVE laid before the Lords Commissioners of His Majesty's Treasury your letter of the 30th ultimo (01487), transmitting a memorandum by the Meteorological Committee stating their views as to the urgent requirements of the Meteorological Office in respect of Staff.

In reply I am directed to say that, in view of the fact that the future organisation of the Meteorological Office is now under consideration, My Lords would not feel justified at the present time in sanctioning permanent scales of salary as proposed.

I am, therefore, to request that you will submit to Them an estimate of what you consider to be the minimum requirements for numbers and salaries for the ensuing year. The salaries should, They consider, be on a provisional basis, and should not exceed such rates as in your judgment will be sufficient to enable you to retain, or engage, the services of a sufficient number of men competent to carry on the work which has to be provided for in the year.

I am, &c.,
ROBERT CHALMERS.

The Director,
Meteorological Office.

M.O. 1,781.

Meteorological Office,
South Kensington, S.W.7,
4th February, 1919.

SIR,

IN reply to Their Lordships' letter 4926.19 of 1st February, 1919, and in compliance with Their request for an estimate of the minimum requirements for numbers and salaries of the Office Staff in the ensuing year it will be convenient if I refer to the estimate forwarded on 6th December, 1918.

At that time the armistice was already signed but in the uncertainty as to the future the estimate prepared on the basis of carrying on during 1919–20 the same services and under the same conditions as in the previous years of war was sent in.

The estimate made provision for a staff of 163 persons (including 14 officers and men of the Meteorological Section, R.E., for whom places were reserved and whose army pay was made up to civil pay) at an aggregate charge of £28,878 including a war bonus on the civil service scale for all except those on military duty and unmarried.

Since the signing of the armistice it has become apparent that the office has still to maintain its full activity in respect of a 24 hour service and the other obligations of a national office to the Naval, Military and Air forces, and also to meet the legitimate requirements of the newspapers and the general public. It has also to take its share in co-operation, as a matter of imperial concern, with Colonial Governments in organising meteorological information for various parts of the Empire and the method of dealing with it. In justification of the added requirements it may be mentioned that the registered correspondence of the office has gone up from 5,000 to 16,000 letters a year.

Moreover, the Committee have been informed by the Army Council that the Council do not propose to continue the establishment of the Meteorological Section, R.E., which was improvised during the war, but to rely upon the State Meteorological Service for the staff necessary to carry on the meteorological work required for army purposes, including gunnery practice, &c., in peace and in war.

Further the Office has been run since the beginning of the war under great strain and with various expedients including the rejoining and retaining of old members of the staff beyond the age of superannuation. The members of the staff who have been responsible for carrying out the 24 hour service, and who were drafted from all sides of the office work, should now be relieved and arrangements placed upon a more regular footing.

* Immediate requirements.

Thus the circumstances for which the Committee have now to provide in order to meet the urgent requirements of 1919–20 are :—

1. To re-arrange the staff of the Central Office in order (*a*) to maintain the 24 hour service of the forecast division and relieve the staff of that division.

   (*b*) To make up the places of eight members of the staff who had passed the age of superannuation and were retained to "carry on" for the duration of the war and who cannot now be reckoned among the "effectives." One of them has recently died and the others should be placed on the pension list though they still remain chargeable on the grant in aid.

2. To bring the staffs of the Observatories up to strength in order to restore the efficiency which was reached before the war and to supplement it where necessary to meet the present urgent requirements.

3. To provide the staff required for the service of the army on a peace footing leaving the provision for the service on a war footing to be provided as required.

It is estimated that for these purposes the Committee require the services of a superintendent, 7 other expert meteorologists, 7 new professional assistants, also 22 clerical and technical assistants (*after absorbing all those now on service who are returning to the Office**) ; of these 4 expert meteorologists, 1 professional assistant, and 16 clerical and technical staff are required for the new service of the army. For the satisfaction of these requirements there are a superintendent, 3 meteorologists who will be demobilised and wish to return. Many of those who have served with the Meteorological Section, R.E., and have improved their technical qualifications. Nine left as boys and will come back as men and will be available to take the places on the staff to which they would have moved in the ordinary course on the superannuation of the seniors. Some have become qualified by experience and training for the professional grade.

In estimating the cost of these additional services the Committee have thought it best to adhere to the practice of quoting the usual salary and a war bonus on civil service terms, as preferable to anticipating for new appointments a policy in respect of the adjustment of salaries on the termination of the war bonus.

For the officers and men returning from service with the forces the Committee have to provide the increments accrued during their absence and also the war bonus for which £1,652 is required.

					£
For the Proposed New Staff :—			Brought forward		1,652
Office and Observatories—	£		£	£	
3 Senior Professional Assistants (£225–£330) ...	280	with war bonus	62	1,026	
6 Junior Professional Assistants (£150–£200) ...	175	„ „	60	1,410	
1 Principal Assistant	225	„ „	60	285	
3 Staff Clerks	175	„ „	60	705	
2 Clerk Computers	75	„ „	60	270	
					3,696
Army Services (Artillery Ranges, &c.)—					
4 Senior Professional Assistants (£225–£330) ...	240	„ „	61	1,204	
1 Junior Professional Assistant (£150–£200) ...	175	„ „	60	235	
2 Staff Assistants	175	„ „	60	470	
11 Clerk Computers	75	„ „	60	1,485	
					3,394
Total					8,742

This makes the total cost of salaries £37,620 of which £3,394 is for army services, instead of £28,878.

The other item of the estimates which needs correction is that referring to the cost of instruments. The whole of the sum of £30,000 set down on a war basis will not be required. Until the arrangements between the various meteorological services are known no very satisfactory estimate can be formed : the figure has been set down at £10,000 and thereby the item of repayment of departmental expenses in the "Appropriations-in-Aid" which is calculated at 5 per cent. of the cost becomes reduced to £500. It is not possible at this stage to say that there can be a corresponding reduction of the staff of the division because the difference is mainly in the scale or volume of the orders not of their number. Some allowance has been made by the reduction of the sum allowed as "unassigned." Some amount is still necessary under that head to provide for adjustments necessitated by the rearrangement of the staff and the incorporation of men of varied experience and qualifications.

With these alterations the estimates become as set out in the accompanying sheet and the Grant-in-Aid estimated as necessary to cover expenses is £47,000.

In this estimate no account has been taken of a proposal which has been before the Meteorological Committee for some time for the transfer to the Office of the work and assets of the British Rainfall Organization. The value of the assets has been agreed upon on the basis of a valuation made for the Committee by a firm of chartered accountants, and it was expected that the formal proposal could have been put forward before Christmas but it has not yet been received from the Organization. The arrangement when complete will involve the payment of a capital sum for the assets and the provision of salaries for the staff against which are to be set receipts for professional services which have up to now been sufficient to make the Organization self supporting.

The Committee regret that they are unable to include the proposals in this letter with a view to the estimates for the coming year. They will make it the subject of a separate communication.

I am, &c.,
NAPIER SHAW.

The Secretary,
H.M. Treasury.

* The words in italics were added after telephonic communication with the Treasury and consequential amendments made in the text.

METEOROLOGICAL OFFICE. AMENDED ESTIMATES for the Year 1919–20.

—	Proposed, 1919–20.	Voted, 1918–19.	Increase.	Decrease.
	£	£	£	£
Salaries :				
Office (including Observatories)	34,226	22,808*	11,418	—
Army Services	3,394	—	3,394	—
Expenses of Office :				
Rent, heating, and lighting	700	700	—	—
Furniture and equipment	50	100	—	50
Library	25	50	—	25
Insurance and repairs	120	120	—	—
Incidental expenses and consumable stores	300	200	100	—
Post Office charges :				
Postage	1,250	800	450	—
Telephones	200	120	80	—
Telegrams	4,110	4,110	—	—
Stationery Office (S.O.P.)	120	120	—	—
Travelling expenses	200	150	50	—
Superannuation allowances :				
Annuities	562	562	—	—
Pensions not chargeable on Fund	25	25	—	—
„ chargeable on Fund	132	276	—	144
Contribution to Fund	1,000	1,000	—	—
Cost of instruments	10,000	10,000	—	—
Expenses of M.O. Observatories :				
Subventions	30	30	—	—
Rent, rates, taxes, repairs, and insurance ...	222	192	30	—
Fuel and lighting	323	263	60	—
Equipment and instruments	265	464	—	199
Cost of forms	136	125	11	—
Consumable stores	177	148	29	—
Books, &c.	65	60	5	—
Incidental expenses	85	91	—	6
Postage, telegrams, and telephones	360	280	80	—
Travelling and motor car expenses	92	127	—	35
Reserve Fund	—	—	—	—
Expenses of auxiliary observatories :				
Subventions (2)	345	345	—	—
Telegraphic, anemographic, and W.W.R. stations	1,000	770	230	—
Incidental expenses of stations, ships, &c. ...	405	265	140	—
Atmospheric Pollution	500	500	—	—
British Rainfall Organization	55	55	—	—
Edinburgh Office	500	380	120	—
Lectures and experiments :				
Schuster Readership	—	—	—	—
Unassigned	215	206	9	—
	61,189	45,442	16,206	459
APPROPRIATIONS-IN-AID.				
Subventions for observatories :				
Atmospheric Pollution	500	500	—	—
Royal Society	1,400	1,500	—	100
War Office	100	100	—	—
Expenses refunded :				
M.O. observatories	155	120	35	—
Auxiliary observatories and stations ...	160	130	30	—
M.O. departmental	500	420	80	—
M.O. incidental	150	150	—	—
Stationery Office account	120	120	—	—
M.O. telegraphic expenses	150	—	150	—
M.O. telephone charges	100	2	98	—
M.O. postage expenses	450	—	450	—
Inspections	100	100	—	—
Instruments	9,700	9,700	—	—
Superannuation, annuities and interest ...	604	604	—	—
Lectures and experiments	—	—	—	—
Total Appropriations-in-Aid	14,189	13,446	843	100
Army pay and deductions on account of members of staff on War Service	—	2,496	—	—
Net totals	14,189	15,942	—	—
[Vote of credit, Salaries	—	4,500]	—	—
[„ „ „ Telegrams	—	2,500]	—	—
Parliamentary Grant-in-Aid	47,000	22,500	—	—
	61,189	45,442	—	—

* Exclusive of £4,500 from vote of credit.

M.O. 2,244.—5766/19.

Treasury Chambers,
13th February, 1919.

SIR,

I AM directed by the Lords Commissioners of His Majesty's Treasury to acknowledge the receipt of your letter of the 4th instant (01781) submitting a revised estimate of the minimum requirements for numbers and salaries of the Office Staff of the Meteorological Office in the ensuing year, and of certain other items; and in reply I am to request you to inform the Meteorological Committee, that My Lords are prepared to ask Parliament to vote an inclusive sum of £47,000 as a grant in aid of your Office during the year 1919–20.

I am, &c.,
ROBERT CHALMERS.

The Director,
Meteorological Office.

Read—the following letter from the Department of Scientific and Industrial Research in reply to the Meteorological Office letter of 12th February, M.O. 2,109 (Minute 740):—

M.O. 2,727.—Ref. S 8/1/19.

Department of Scientific and Industrial Research,
15, Great George Street,
Westminster, S.W. 1,
24th February, 1919.

SIR,

IN reply to your letter of the 15th February, I am directed to say that the Committee of Council for Scientific and Industrial Research note the programme of work set out in paragraph 3 of your letter and the description of the present activities of the Meteorological Committee.

I am to say that it is not possible, in the present circumstances, to reply in detail to the points raised in your letter, since the Government have not yet determined to make a change in the present constitution of the Meteorological Office, nor indeed, have they decided, should any change be made, whether the work of the Meteorological Office should be transferred to the Committee of Council or to some other Department.

I am to say, however, that should the Meteorological Office be transferred to the Committee of Council they trust Fellows of the Royal Society will continue to take an active part in the management of the Office, and that there is nothing inherent in the constitution of the Department of Scientific and Industrial Research which would debar it from making provision for activities such as those outlined in your letter. Nor do they see any reason to believe that the proposals which were outlined in their letter for the future administration of the Meteorological Office would affect unfavourably the prospects of the programme of activities which the Meteorological Office have in view. Indeed, in respect of several items of the programme, the administrative arrangements which were indicated would appear to be more appropriate than those at present in force.

I am, &c.,
H. FRANK HEATH.

Sir Napier Shaw, LL.D. F.R.S.,
Meteorological Office, S.W. 7.

Reported also—a confidential communication from Sir Frank Heath, enclosing a secret memorandum prepared by the Air Ministry and the Chairman's reply thereto.

In connection with the International conference of the Allied Nations proposed by the Comité d'Action des Services Météorologiques Français (Minute 739) it was reported that it had been thought desirable for a previous conference to be held of the meteorological authorities of the various States of the Empire, and that the following letter had been addressed to the Colonial Office, the Foreign Office, and the India Office :—

M.O. 2370.

Meteorological Office,
South Kensington, S.W. 7,
17th February, 1919.

Sir,

AT the last meeting of the Meteorological Committee it was reported that the French Government proposed to call an International Conference of the Allied Nations to discuss meteorological questions of common interest, in the middle of next summer.

The various states of the British Empire occupy positions of great importance in relation to nearly all questions of common interest in meteorology, and there is, at the moment, no organised machinery for the exchange of views between the responsible meteorological authorities of the several parts of the Empire. The ordinary avenues of correspondence became more and more restricted as the war went on and should now be re-opened on more defined lines because the scope of meteorological work has been very much widened by the experience of national and imperial requirements during the war, and the extension of aerial navigation will form a new means of communication, even between the most widely separated parts of the Empire, which is more dependent than other means of communicaton upon effective knowledge of meteorological conditions.

It would place the meteorological authorities of the home countries, as well as those of the Dominions beyond the seas, in a much more favourable position for arriving at a common understanding at an International Conference of the Allied Powers, representing a great variety of interests, in as many languages, if they had first an opportunity of exchanging between themselves information as to the position and progress of meteorological work in their own Countries and their view as to the best ways of securing helpful co-operation.

We therefore request you to submit to { Viscount Milner / Mr. Balfour / Mr. Montagu } our proposal that the Dominions and

Colonies which have organised meteorological services should be invited to send delegates to a conference of meteorologists of the various States of the Empire to be held in London in the last week in May.

The Agenda of the proposed conference may be summarised under the following heads :—

1. The arrangements of observations and hours for (*a*) telegraphic reports, (*b*) climatological data with a view to the combination of the data in comprehensive maps for general meteorological purposes and the navigation of the air.

2. The organisation of observations of the upper air supplementary to the ordinary observations of meteorological stations to meet the needs of aerial navigation.

3. The relation of the general Meteorological Services of the State to the special requirements of the Naval, Military and Aerial Services, which include among others the effect of meteorological conditions upon ballistics, sound-ranging, chemical warfare, and internal combustion engines.

We are, &c.,
NAPIER SHAW,
H. G. LYONS.

The Under Secretary of State.
{ Colonial Office.
Foreign Office.
India Office.

Reported also—that the following letter had since been received from the Comité d'Action :—

M.O. 3348.

Paris,
le 4 Mars, 1919.

Le Secrétaire Perpétual de l'Académie des Sciences. Président du Comité d'Action des Services Météorologiques Français, à Monsieur le Directeur du Meteorological Office.

MONSIEUR LE DIRECTEUR,

EN réponse à votre lettre du 24 Février, 1919, j'ai l'honneur de vous faire connaître que la date de la réunion Météorologique interalliée proposée par le Comité d'Action des Services Météorologiques Français ne pourra être fixée qu'après la signature des préliminaires de paix. Ce n'est, en effet, qu'à ce moment que les différents Services Météorologiques connaîtront les ressources dont ils pourront disposer.

Veuillez agréer, Monsieur le Directeur, l'assurance de ma considération très distinguée.

Pour le Président,
Le Secrétaire Général,
J. ROUCH.

Read—the following letter from the Air Ministry in reply to a letter from the Meteorological Office suggesting that a meeting of representatives of the Admiralty, the Air Ministry, and the Meteorological Office should be arranged to discuss proposals or amendments to the draft code circulated by the Comité d'Action in September, 1918 :—

M.O. 2,974.—B. 9212 (F.O. 5).

Air Ministry,
Strand, W.C.2,
27th February, 1919.

SIR,

In reply to your letter of 21.2.19, I am directed to enclose for your information a copy of a code which it is proposed to bring into use very shortly for the wireless transmission of meteorological information to the U.S. of America. It is thought that this code will meet all requirements for International exchange of meteorological information.

Provision in the identification list can easily be made for the Atlantic Control Points when these have been fixed.

I am, &c.,
L. F. BLANDY,
Deputy Director of Communications.

The Director,
Meteorological Office.

Read also—a letter from the Meteorological Branch of the Air Ministry explaining in reply to inquiry that the results of inquiries carried out by members of the staff of the Branch in the library of the Office were not at present available for general use owing to lack of staff at the Branch.

Read—the following letter from the Technical Department of the Ministry of Munitions (Air Group) :—

M.O. 3,583.

Technical Department,
Kingsway, W.C.2,
8th March, 1919.

SIR,

I BEG to enclose a copy of a communication received from Messrs. Boulton & Paul, of Norwich, requesting certain meteorological information.

All the information required is not available in this Department, and it would be appreciated if you would take the matter up with them and supply any such information as may be immediately available. You are no doubt in a position to give some idea as to what arrangements can be made with regard to obtaining weather reports from Canada.

I am, &c.,
W. SEMPILL,
Colonel R.A.F.,
Assistant Controller, Design.

The Director,
Meteorological Office.

AZ/RC.

Boulton & Paul, Ltd.,
Aircraft Works, Norwich,
6th March, 1919.

SIR,

WE would be glad if you would let us know what meteorological information you have available in connection with the projected Trans-Atlantic Flight, and what arrangements as regards the receival of weather reports, &c. from Canada and London are likely to be made.

Yours faithfully,
for Boulton & Paul, Ltd.,
A. ZAIMAN.

The Controller,
Technical Dept. Aircraft Production,
Central House,
Kingsway, W.C.2.

Read—the following letter from Colonel Chaves :—

M.O. 3,565

Horta (Fayal Island),
10th February, 1919.

MY DEAR COLLEAGUE,

I HAVE received from my Government a copy of a request made by the British Minister in Lisbon, according a solicitation of the Ministry of Aviation, of your country, to be sent from the Azores to the Meteorological Station of Valetta (Malta) the following information based on observations made at 7h. a.m. of the G.M.T. :—

(*a*) Wind at surface-direction and velocity.
(*b*) Pressure-characteristic and barometric tendency.
(*c*) Weather at the time of observation.
(*d*) Direction of the movement of the clouds.
(*e*) Rainfall.
(*f*) Temperature—maximum, minimum, and of the sea (*sic*).

By our frequent experience we know to be more practicable and convenient that the Directors of Foreign Meteorological Services address to me directly all their requests of informations needed from this Meteorological Service of the Azores, under my general direction. Afterwards, if necessary, the intervention of diplomatic authorities, I indicate it. If the request above indicated of your Ministry of Aviation was made through you, I am sure that you will have treated with the "Europe and Azores Telegraph Company" or with the "Eastern Telegraph Company" (both at the Electra House, London) the question of payment, or of gratuity of the telegraphic expedition of the daily meteorological cablegrams between the Azores and Malta. Surely you will have treated this question, because you know that the observatories of the Azores can send free only the meteorological cablegrams between these Islands and the landing point of the English or American cables in Europe or America and no more.

The cables between Ponta Delgada, Lisbon and Horta are broken since the month of December. I came then to this Island of Fayal to treat this question, and others connected with meteorological messages to America, with the Superintendent of the "Europe and Azores Telegraph Company" at Horta. He had wired to his Head Office in London presenting the request made by your Ministry of Aviation, through your Minister in Lisbon, and the answer received by him, and communicated also by him to me, was :—"*My Head Office in London, replying to your inquiry about sending a daily meteorological message to Malta, says that such messages can be transmitted at half rates throughout, and asks me to ascertain how the proposed messages will be addressed and where the charges for them will be collected.*" To-day I have communicated to my Government this answer, and I suppose that your Minister in Lisbon will treat this question with the "Europe and Azores Telegraph Company," in Lisbon.

I have also communicated to my Government that, as Delegate of Portugal, and Member of the International Meteorological Committee, I have presented to you, in the quality of President of the indicated Committee, and Scientific Adviser to your Government in Meteorology, the following subjects for resolution :—

1st, The meteorological telegram to Malta must be enciphered according the "New Telegraphic Code for Meteorological Information, within the European System, for Continental Reports"?

2nd. If so, it must be arranged in three groups of five letters and one of four letters, according the order indicated in the request of the Ministry of Aviation, *viz* :—

WWSBB BβbbH CRRTT MMmm ?

Or in the order combined for Continental reports which seems to me preferable, namely :—

BBBWW SHTTC βbbRR MMmmSea ?

3rd. The pressure and the barometric tendency must be indicated in millimetres, or in millibars?

4th. Which is the telegraphic address of the Meteorological Station of Valetta ?

In the request of your Ministry of Aviation it is only indicated the wish of a daily message from observations made at 7h. G.M.T. in the Azores. You know that I can send observations from *Horta*, *Ponta Delgada*, *Flores* and *Angra*, but I suppose that the observations of Horta are preferable, because it is only at Horta that are established different English and American cables, always in work. At Ponta Delgada or Angra the telegraphic Stations are open only from 8h. a.m. till 8h. p.m. of the Azores time. From Horta the telegram for Malta can be sent at 6h. 10m. (Azores time) correspondent to 8h. G.M.T.

At Flores we have only a wireless station working but very irregularly which is very inconvenient to the meteorological service : in view of the great meteorological importance of Flores.

Please also to indicate me if the telegram from Horta it is sufficient or if the Ministry of Aviation desires some other observations. We have not at the Observatories of this Service boats and personel to send at 7h. G.M.T. (*i.e.*, during the night in a part of the year) to the sea for the observation requested of the temperature of the sea : and I don't understand what is the convenience of the

knowledge of it at this hour. At 2h. p.m. Azores time, every day, we can order to be made this observation.

Instead of the temperature of the sea I suppose preferable to be sent to the *Sea disturbance*, on the scale 0–9. With this indication the fourth group of the telegram arranged in the order combined for Continental Reports (see sheet 2) is completed with the fifth letter.

Do you approve this ?

Please combine all these questions with your Ministry of Aviation, and to have the kindness to indicate me your wishes.

Always it is to me an agreeable duty to satisfy your wishes and those of your country.

P.S.—I must return to Ponta Delgada on the 20th of this month.

Yours sincerely,
F. A. CHAVES.

Sir Napier Shaw,
Scientific Adviser to H.M. Government in Meteorology,
Meteorological Office, London.

With regard to the proposed transfer of the Office to the Department of Scientific and Industrial Research it was agreed that no objection would be raised on the general principle, and that, if the Treasury approve of the principle, arrangement should be made with Sir Frank Heath about going into details of management and transfer.

750. ADVISORY COMMITTEE ON ATMOSPHERIC POLLUTION (Minute 718).—*Application for Grant for* 1919–20.—Reported—covering letter and report as follows :—

M.O. 3591,

Advisory Committee on Atmospheric Pollution,
47, Victoria Street,
Westminster S.W. 1,
24th February, 1919.

SIR,

AT a meeting of the Advisory Committee on February 7th convened for the purpose of considering a letter from the Department of Scientific and Industrial Research addressed to the Meteorological Office asking for a statement of work done, and reminding the Meteorological Office that any application for a new grant for the investigation of Atmospheric Pollution for the new financial year would require consideration by the Council of the Department before the close of the current year, it was decided to request the Meteorological Committee to make an application to the Department for a grant to meet expenses of £635 in the year 1919–20 as set out in the following estimate.

Estimate of Expenses for 1919–20.

	£
Publication of report of 1918–19	140
Honorarium of Secretary	100
Inspections	50
Assistant for Research (Half year's salary September to March)	125
Construction of continuous filter	50
Apparatus and Materials for Research on Acidity, &c.	100
Office Expenses	70
	£635

It is estimated that of the grant for the current year £10 will remain when the expenses chargeable upon it have been met, the balance would be set off against the proposed expenditure of £635.

In pursuance of the decision of the Advisory Committee, the report on the work of the Advisory Committee, as set out herein, has been addressed to the Meteorological Committee asking for an application for a renewal of the grant to be put forward.

It is proposed that Professor H. B. Baker, C.B.E., F.R.S. of the Royal College of Science, should be nominated a member of the Advisory Committee, with a view to his joining the Chemical Sub-Committee. Professor Baker has been asked if he would serve on the latter, and has agreed to do so. It is important to have his assistance in the researches now in hand on acidity of the air, and it is therefore proposed to ask Professor Baker to take part in the work of the Sub-Committee in anticipation of the formal nomination which will be submitted to the next meeting.

I am, &c.,
J. S. OWENS

The Director,
Meteorological Office.

METEOROLOGICAL OFFICE, LONDON.
ADVISORY COMMITTEE ON ATMOSPHERIC POLLUTION.

47, Victoria Street,
Westminster, S.W. 1,
London,
February 17th, 1919.

REPORT TO THE METEOROLOGICAL COMMITTEE OF PROCEEDINGS IN THE YEAR 1918.

The Advisory Committee at the close of the year consisted of the following members :—

Sir Napier Shaw, F.R.S., Director of the Meteorological Office (*ex-officio*) (Chairman).	Appointed by the Meteorological Committee.
Captain C. J. P. Cave (Past President of the Royal Meteorological Society).	
Mr. J. G. Clark, F.I.C.	
Professor J. B. Cohen, B.Sc., Ph.D., F.R.S. (Professor of Organic Chemistry, Leeds University).	
Dr. H. A. Des Voeux (Hon. Treasurer, Coal Smoke Abatement Society).	
Dr. J. S. Owens (Coal Smoke Abatement Society).	
Dr. E. J. Russell (Director of the Rothamsted Experimental Station, Harpenden).	
Bailie W. Smith (Member of Departmental Committee on Smoke Abatement).	
Mr. S. A. Vasey, F.I.C., F.C.S. (Director of the "Lancet" Laboratory).	
Mr. F. J. W. Whipple (Superintendent of the Statistical Division, Meteorological Office).	

Dr. John Robertson, nominated by the Corporation of Birmingham.	Appointed by the Municipal Authorities contributing observations.
Dr. W. Hanna " " " Liverpool.	
Dr. W. J. Howarth " " " the City of London.	
Mr. Henry Mills, J.P. " " London County Council.	
Mr. W. Osborne Thorp " " Corporation of Malvern.	
Prof. W. Haldane Gee " " " Manchester.	
Mr. C. T. Stableforth, J.P. " " " Newcastle-on-Tyne.	
Dr. J. B. Wilkinson " " " Oldham.	
Dr. J. R. Ashworth " " " Rochdale.	
Dr. Cates " " " St. Helens.	
Mr. John Fyfe " " " Stirling.	
Mr. W. S. Curphey (Chief Alkali Inspector of the Local Government Board).	Appointed by the Advisory Council for Scientific and Industrial Research.

Four Meetings of the Committee have been held on the following dates :—

July 12th, 1918.
November 15th, 1918.
December 16th, 1918.
February 7th, 1919.

The Sub-Committee to consider points arising in connection with the chemistry and physics of the atmosphere was continued and now consists of the following members :—

Mr. J. G. Clark, F.I.C.
Dr. E. J. Russell, Director of Rothamsted Experimental Station.
Mr. S. A. Vasey, F.I.C., F.C.S. (Director of the "Lancet" Laboratory).
Mr. F. J. Whipple (Superintendent of the Statistical Division, Meteorological Office).
Professor Haldane Gee, Manchester.

Three Meetings of the Sub-Committee have been held, and the following programme of research has been drawn up :—

(1) Investigation of acidity of the air, to cover not only deposit but suspended matter in the air.

(2) The vertical distribution of suspended impurities. It was considered that this would probably have a practical bearing upon the best position for ventilation intakes, as well as on other matters.

(3) The relation between bacterial contents of the air and smoke contents. It was thought possible that there might be a discoverable relation, possibly an inverse one, and as Dr. Owens reported that he had evolved a suitable filter for removing the bacteria, it was considered advisable to proceed with this research

(4) Pollution by motor as compared with horse traffic. This was suggested by Mr. Vasey in the hope that useful results might be obtained arising from the great change in recent years in the nature of traffic.

(5) A microscopical examination of the impurity suspended in the air, particularly with a view to a measurement of the size of particles. It was thought that information might be forthcoming from such an investigation on the distances to which impurities travelled from their sources.

(6) The selective effect of rain or snow in bringing down certain constituents of the suspended impurity in preference to others.

(7) The effect of suspended impurity in obstructing light.

Mr. G. M. Watson, B.Sc., Chemistry, London (Honours) : Associate of the Royal College of Science, has been appointed Assistant to conduct the researches under the direction of the Sub-Committee. The investigation of apparatus for testing the acidity of the atmosphere commenced on the 3rd instant.

Twenty-five standard gauges were maintained in operation during the year by 10 Municipalities, and one gauge by the Meteorological Office. The results have been compiled and discussed in a report which was presented to the Department of Scientific and Industrial Research, and with the approval of this Department it has been arranged for the "Lancet" to publish the report as a supplement to this Journal. 1,000 separate copies are to be supplied for the use of the Advisory Committee.

The automatic filter designed by Dr. Owens has been completed. Endeavour has been made to have a number constructed by a firm of instrument makers, but they returned the model after some months because they were unable to obtain the necessary material and labour. Subsequently the model was offered to the National Physical Laboratory for the construction of an instrument in its final form, with a view to having larger quantities made. After inspection it was reported to be in a suitable form for that purpose and the construction of a revised model was regarded as unnecessary.

The inspection of the standard gauges in the several districts has not yet been effected, but it is ntended to complete it before the 31st March, 1919.

The Advisory Committee desire to submit an application for a grant from the Department of Scientific and Industrial Research for the year 1919/20; the amount estimated to be required for the year is £635, inclusive of a balance of £10, estimated to remain out of the grant for the current year, when the obligations of the year have been met.

NAPIER SHAW,
Chairman of Advisory Committee.

It was agreed (1) that application be made to the Department for a Grant of £635 as requested by the Advisory Committee on Atmospheric Pollution.

(2) that Professor H. B. Baker, C.B.E., F.R.S., be appointed a member of the Advisory Committee.

751. BRITISH RAINFALL ORGANIZATION (Minute 730).—Reported—that a letter had been received from Dr. Mill (M.O. 17,583) on 19th December, 1918, saying that the Trustees of the Organization were prepared to proceed upon the terms put forward in the Meteorological Office letter of 6th December, 1918 (M.O. 16,936) and that they would submit a draft agreement at an early date. Reported also—that the draft agreement had been forwarded on 11th March, 1919, with the following letter :—

M.O. 4314.

10, Billiter Square,
London, E.C.3,
11th March, 1919.

DEAR SIR,

BY the direction of the Trustees of the British Rainfall Organization, we enclose for your consideration the Draft of the Transfer of the Organization to the Meteorological Office.

We shall be glad to have the Draft back approved in due course, and meanwhile to see you upon it, if you think this necessary.

We are, &c.,
DRUCE & ATTLEE.

Colonel H. G. Lyons, F.R.S.,
Meteorological Office.

It was agreed that the proposal for taking over the British Rainfall Organization together with the draft agreement be submitted to the Treasury.

NINETY-SECOND MEETING.

South Kensington, S.W. 7, 26th March, 1919.

PRESENT :

SIR NAPIER SHAW, IN THE CHAIR.

MR. BARSTOW. | THE HYDROGRAPHER.
CAPTAIN HARVEY. | COLONEL LYONS.

DR. SCHUSTER.

752. The Minutes 747–751 of the Meeting 12th March, 1919, previously circulated, were taken as read and confirmed.

753. CORRESPONDENCE.—**Air Ministry.**—*Proposed Transfer of Lieut.-Col. Gold.*—Read—the following letter :—

M.O. 4302.—A15038.

Air Ministry,
Strand, W.C. 2.,
24th March, 1919.

SIR,

I AM commanded by the Air Council to state that, in connection with the new Department of Civil Aviation, it will be necessary to re-organise the existing Meteorological Branch at the Air Ministry and the Air Council is desirous of securing for this Branch a person possessing the necessary expert knowledge and organising capacity.

The Controller General of Civil Aviation has recently had an interview in France with Colonel Gold who has expressed his willingness to accept the position if it can be arranged. He would come on condition that he had the option of returning to the Meteorological Office if either (*a*) he found the work uncongenial or (*b*) he was found unsuitable in the organising capacity for which his services are required during the first six months.

It is understood from a conversation on the telephone with General Headquarters in France that Colonel Gold will be demobilised shortly as his services will no longer be required by the War Office. I am commanded, therefore, to make a formal application for him to be allowed to come to the Department of Civil Aviation on the above conditions.

I shall be very glad if this matter can be treated as urgent.

I am, &c.,
W. A. ROBINSON.

The Secretary,
Meteorological Office.

The following reply was approved for transmission to the Air Ministry :—

M.O.4417.

Meteorological Office,
South Kensington, S.W. 7.,
26th March, 1919.

SIR,

Your letter dated March 24th, 1919, was received at this Office yesterday and was brought before the Meteorological Committee this afternoon.

Lieut.-Col. Gold's name has been retained on the staff of this office as superintendent during the period of his employment as Commandant in France of the Meteorological Section R.E. with the understanding that upon demobilisation he would be available to return and would return to take up duty at the Office on the terms applicable to members of the Civil Service who joined the army with the sanction of the Head of the Department in which they were employed.

The Meteorological Committee recognise that Lieut-Col. Gold's experience may be of considerable assistance to the Country through the Air Ministry at this juncture and they are desirous of assisting in the co-ordination of the various services for their common purposes, but before the Meteorological Committee could consent to placing the services of Colonel Gold at the disposal of the Air Ministry they feel that it would be necessary to know what would be the nature of the relationship between the Meteorological Branch of the Air Ministry and this Office and whether the proposed arrangement has the approval of H.M. Government.

I am, &c.,
NAPIER SHAW.

The Secretary,
Air Ministry,
Strand, W.C. 2.

Advisory Committee for Aeronautics.—*Camera Theodolite.*—Reported—the following letter :—

M.O. 2142.—O.1700

National Physical Laboratory,
Teddington, Middlesex.

SIR,

The Meteorology Sub-Committee of the Advisory Committee for Aeronautics has had under consideration the methods to be employed in the future at meteorological stations for obtaining more complete information as to the wind velocity and direction at considerable heights, information which is of much importance for aeronautical purposes. Among the methods suggested are those which involve observation of the movements of pilot balloons, smoke puffs and clouds.

In connection with such observations it is considered that it would be of great value if a suitable type of camera theodolite were designed and constructed. It has been suggested that experiments might be made on two types one of which would be capable of taking exposures every ten seconds or at longer intervals and would be worked by hand, while with the other type exposures every second or more frequently would be made automatically.

I am instructed to ask you to bring before the Meteorological Committee the need of such an instrument, in the hope that they may be able to take up the matter and to secure that it receives attention, and that steps are taken towards the production of an instrument of such a type or types as on further investigation may be found likely to be of most value. Some suggestions for a design have been laid before the Committee by Mr. A. Mallock, F.R.S. and I am directed to forward herewith a copy of the papers (Met. 7 and 21) in which these are put forward.

You will perhaps be good enough to let me know in due course what action the Meteorological Committee hope to be able to take in the direction indicated.

I am, &c.,
F. J. SELBY,
Secretary.

The Secretary,
Meteorological Committee.

It was agreed that a letter should be sent to Mr. Mallock asking on what terms he would undertake the preparation of working drawings of the instrument required, and the supervision of its eventual manufacture.

Carnegie Institution of Washington.—*Observations of Solar Eclipse of 29th May, 1919.*—Reported—that a letter (M.O. 3,642) had been received from the Director of the Carnegie Institution of Washington (Department of Terrestrial Magnetism) giving particulars as to the arrangements which were being made for "magnetic and allied observations" during the total solar eclipse of 29th May, 1919, and that instructions had been given for co-operation on the part of the observatories at Richmond and Eskdalemuir.

Ships.—*Meteorological Reports by Wireless Telegraphy.*—Reported—that progress was being made with regard to the arrangements for the transmission of meteorological reports by wireless telegraphy and that conferences had been held at the Admiralty. A draft of Meteorological Instructions for ships furnishing meteorological reports by wireless telegraphy had been prepared but was not yet completed.

Interchange of Meteorological Reports by Wireless Telegraphy.—Reported—that arrangements were being made for the transmission and reception of meteorological reports by wireless telegraphy, and that the transmission of such reports to G.H.Q., France, had begun on 21st March, 1919.

British Rainfall Organization (Minute 751).—Reported—that in accordance with the decision of Minute 751 the following letter had been sent to the Treasury enclosing the draft agreement of the proposed transfer of the British Rainfall Organization to the Meteorological Office :—

M.O. 4070.

Meteorological Office,
South Kensington, S.W.7,
17th March, 1919.

SIR,

British Rainfall Organization.

WITH reference to my letter of 4th February 1919, I beg leave to inform you that the Director and Trustees of the British Rainfall Organization have now submitted for approval a draft agreement for the transfer of the Organization as a going concern, and the Meteorological Committee are now therefore able to formulate a proposal for Their Lordships' consideration.

In doing so I ought to note that the steps leading up to the proposal have been as follows :—

1. An application to the Treasury, dated 5th November 1913 by the British Rainfall Organization for an annual grant of £750 and a block grant of £5,000 from the Development fund forwarded to the Meteorological Office for observations on 9th March 1915 together with a recomendation on the par

of the Board of Agriculture and Fisheries of a conditional grant of say £300 per annum, with certain stipulations as to the representation of the Meteorological Committee on the controlling body of the Organization (M.O. Minute 504).

2. Letter dated 22nd April 1915 expressing the opinion of the Meteorological Committee that if a considerable grant is made from Government funds the work of the Organization should be co-ordinated with that of the Meteorological Office (as it is in other countries) on the ground that "Rainfall is an important branch of meteorology. All meteorological stations include observations of rainfall and a duplicate organisation for the control and inspection of stations would be a false step" (M.O. Minute 513).

3. Correspondence with the Treasury reported by the Development Commission to the Meteorological Committee on 27th October 1915 concluding with copy of Treasury letter dated 3rd July 1915 to Secretary, Development Commission, suggesting that the question should be allowed to remain in abeyance for the present, and in the meantime the Director of the Office in consultation with Dr. H. R. Mill and the Meteorological Society of Scotland "should consider informally at leisure the question of making adequate arrangements, in future, with due regard for economy, for collecting and publishing reliable records of the rainfall" (M.O. Minute 541).

4. Confidential report by the Director to the Committee on 26th January 1916 setting out provisional statement of terms of an agreement between the Meteorological Office and the Organization and the comments thereupon, concluding with the note, "Dr. Mill does not contemplate any action so long as he remains Director of the Organization but he is willing to see the arrangements for the union of the Organization with the Meteorological Office completed, and in partial operation at least, within the term of office of the present Director of the Meteorological Office" (Confidential proof of advanced Minute dated 19th January 1916).

5. Further progress awaited figures as to receipts and expenses upon which an estimate of current expenses could be based, and no step was taken during the intervening three years to supply these.

6. Letter 6700/750 from the Development Commission dated 28th September 1918 forwarding an application to the Treasury by the Chairman of the Trustees of the British Rainfall Organization for a grant of £1,500 from the Development Fund for the preparation of a rainfall map of the British Isles with a Report of the Board of Trade dated 17th September 1918 in support of the application with a view to water power, and asking for the views of the Committee (M.O. Minute 722); also report by the Acting-Director of the Meteorological Office setting out that Dr. Mill now wished to be relieved of his work at the British Rainfall Organization on the ground of ill-health and was desirous that the Organization should be transferred to the Meteorological Office by the end of the current year (1918) (Copy of report attached).

Agreement was reached by the Meteorological Committee on 23rd October 1918 to report to the Treasury in favour of taking over the work of the British Rainfall Organization if the Organization would give facilities for a valuer to report upon the financial position in order to arrive at a sum to put before the Treasury (M.O. Minute 722).

7. Report received from Messrs. Price, Waterhouse and Co. recommending as the consideration for the property of the Organization as a going concern a capital sum sufficient to provide an annuity of £500 on the life of Dr. H. R. Mill (Copy of valuation attached).

8. Draft agreement embodying these terms submitted to the Meteorological Committee, 12th March 1919, by the Trustees of the British Rainfall Organization and now forwarded herewith for the consideration of Their Lordships.

In order to form an estimate of the cost which would be involved in maintaining the work of the Organization it is necessary to remark that the information upon which the work of the association is based is mainly derived from "voluntary" observers in all parts of the country to the number of 5,200 who respond to the invitation to join in the compilation of a body of statistics of rainfall as a scientific enterprise to which they may contribute either observations or money or both. The out-goings of the Organization in respect of stations are therefore only costs of correspondence, and inspection (if any), and the cost of maintenance of a station at 62, Camden Square. The item "observers and instruments" stands in the accounts as only £34. The expenditure of the Organization is devoted to the examination and arrangement of the records received, the compilation of monthly and annual results and the issue of the annual results in the form of an annual volume of *British Rainfall*, now in its 58th year. There is besides a small monthly periodical known as Symons' Magazine which is a medium of general communication between the direction and the observers, and is now in its 53rd year.

The expenses for 1916 were :—

	£
For observations	34
Salaries of Staff	660
Printing British Rainfall and Symons' Magazine	468
Establishment expenses	207
	£1,369

In the report the present salaries of staff are given as £860 (including professional fees) and the fees of the director in addition as £750, making in all £1,610.

The receipts were mainly what are called "subscriptions," which are voluntary contributions to the enterprise partly compensated by copies of the British Rainfall and Symons' Magazine which are presented to a "Subscriber" of half the price, who is also an "*observer*." No distinction is drawn between subscribers to the publications and subscribers to the general funds of the Organization. Taking the amount realisable for the sale of British Rainfall, on the assumption that the voluntary contributions to the scientific enterprise will cease, at one-third of the subscription we may estimate the future receipts from this source at £350.

Another item which will lapse is "interest on the endowment" of the Organization, consisting of funds contributed by friends of the Organization which the Trustees do not propose to include in the transfer.

On the other hand there is a separate professional side of the work of the Organization, namely the supply of information about rainfall as evidence in courts of law or before Parliamentary committees. This was the personal undertaking of the Director, and it is understood that the receipts amounted to £900 per annum of which £750 was the Director's personal share. The balance should be taken as additional remuneration to the staff and is included under that head in the memorandum.

The staff has been reduced to a minimum during the war; upon Dr. Mill's retirement and the transfer of the Organization to the Office it must be strengthened. For the time being this is taken as provided for by adding the £750 for professional fees to the total of existing salaries of the staff.

Hence as a provisional estimate of the prospective receipts and expenditure after transfer we may take :—

Receipts.	£	*Expenditure.*	£
Sale of publications and advertisement ...	466	Rent (draft agreement, folio 11)	70
Supply of data, maps &c.	13	Salaries	1,610
Certificates	8	Observers and instruments	35
Expert evidence	900	Printing of publications	470
Meteorological Office present contribution	55	Office expenses (so long as the work is continued in a separate establishment)	315
Balance	1,058		
	£2,500		£2,500

How far the receipts for expert evidence should or could be maintained in the new circumstances depends upon the conditions which Government may decide to be appropriate for the supply of the information to courts of law or inquiry. Supposing no loss is experienced on that account, the increase of charge upon Office funds for the maintenance of the Rainfall Organization as part of the Meteorological Office in the coming year would probably work out at about £1,000.

Arrangement should in due time be made with the Scottish Meteorological Society as that Society already publishes full monthly values for the Scottish stations. But this cannot properly be taken up until a decision is reached with regard to the British Rainfall Organization.

Hence the proposals which the Meteorological Committee have to submit for Their Lordships' consideration are :—

1. The provision of a capital sum sufficient to provide an annuity of £500 a year during the life of Dr. H. R. Mill as consideration for the rainfall records and other property of the Trustees as set out in the draft deed of transfer. At the same rates as Post Office annuities this capital sum would work out at £5,600.

2. The payment of the costs of the transfer.

3. The charging of the grant in aid of the Meteorological Office to the extent of £1,000 a year for the maintenance of the work of the Organization, so far as may be, on its present lines, and in consequence the increase of the grant-in-aid by £1,000 for the year to meet the added cost.

I am, &c.,

NAPIER SHAW.

The Secretary,
Treasury,
Whitehall, S.W. 1.

754. OFFICE STAFF.—**The late Captain Hepworth** (Minute 748).—Reported—that Miss Juliet C. Hepworth had been left in very straitened circumstances on the death of her brother the late Captain Campbell Hepworth.

The Chairman undertook to move in the matter of an appeal for a pension from the Civil List and enlist the support of the Hydrographer and the Brethren of Trinity House.

Resignations.—R. E. Watson (Minute 742).—Reported—that the resignation of Mr. R. E. Watson, Meteorologist-in-Charge of Falmouth Observatory, had been accepted as from 28th February, 1919.

J. E. Bassett (Minute 654).—Reported—that the resignation of Mr. J. E. Bassett, senior packer in the Instruments Division, had been accepted as from 15th February.

New Appointments.—L. F. Richardson (Minute 729).—A sum of £450 was set aside as salary in the year 1919–20 for Mr. L. F. Richardson now occupied in experimental meteorological work at Benson, with Mr. Dines's sanction. The terms and conditions of an appointment to be subsequently submitted for approval.

Authority was given for the following appointments to take effect from 1st April, 1919, unless otherwise stated. Salaries quoted are exclusive of such war bonus as may be payable under existing regulations.

J. S. Dines (Minute 715) to be Assistant Superintendent with a salary of £431 16*s.* per annum

Captain A. H. R. Goldie (Minute 623) to be Assistant Superintendent with a salary of £431 16*s.* per annum.

Captain D. Brunt (Minutes 580, 592) to be Assistant Superintendent with a salary of £431 16*s.* per annum.

H. W. Absalom, B.Sc., to be Senior Professional Assistant with a salary of £247 10*s.* per annum.

W. C. Kaye, B.Sc. (Minute 623) to be Senior Professional Assistant with a salary of £225 per annum.

G. R. Hay, B.A., to be Senior Professional Assistant with a salary of £247 10*s.* per annum.

J. Durward (qualified for B.Sc.) to be Senior Professional Assistant with a salary of £255 per annum.

M. A. Giblett, B.Sc., M.Sc., to be Senior Professional Assistant at a salary of £225 per annum, for duty at any of the observatories connected with the Meteorological Office or elsewhere in the United Kingdom. The appointment to date from 24th March, 1919 (Order 807).

N. H. Smith (Inter B.Sc.) to be Junior Professional Assistant at a salary of £125 per annum, for duty at any of the observatories in the United Kingdom. The appointment to date from 10th March, 1919 (Order 805).

H. D. K. Millar to be temporary Clerk Computer at Kew Observatory at a salary of £75 per annum. The appointment to date from 17th March, 1919 (Order 806).

P. Powell to be boy clerk in the Forecast Division at a salary of 17*s.* 6*d.* a week. The appointment to date from 3rd March, 1919 (Order 802).

H. J. Bigelstone (Minute 630) to be probationer for duty in the Instruments Division at a salary of 22*s.* a week. The appointment to date from 3rd March, 1919 (Order 803).

Promotions.—The following promotions were approved as from 1st April, 1919. The salaries quoted are exclusive of such war bonus as may be payable under existing regulations.

To be Senior Professional Assistants :—

Capt. F. Entwistle (Minute 623) at a salary of £277 10*s.* per annum from Junior Professional Assistant.

M. T. Spence (Minute 574) at a salary of £225 per annum, from Clerk Assistant.

Miss L. D. Sawyer (Minute 667) at a salary of £225 per annum, from Junior Professional Assistant.

To be Junior Professional Assistant :—

H. W. Braby (Minute 479) at a salary of £125 per annum, from Graduate Assistant.

To be Staff Assistants at a salary of £175.

C. A. Bracey (Minute 51) from Staff Clerk.

J. T. Williams (Minute 111) from Staff Clerk.

L. H. Powers from Staff Clerk.

Miss R. E. Smith (Minute 568) from Staff Clerk.

Miss D. G. Chambers (Minute 667) from Staff Clerk.

R. Pyser (Minute 574) from Clerk Computer.

To be Staff Clerks :—

A. A. Lovie (Minute 638) at a salary of £125 from Clerk Computer.

A. E. Pycock (Minute 568) at a salary of £125 from Clerk Computer.

To be Clerk Assistants :—

Miss H. W. Newsholme (Minute 667) at a salary of £111 10*s.* from Temporary Clerk.

E. L. Clinch (Minute 559) at a salary of £90 from Probationer.

C. F. J. Jestico (Minute 623) at a salary of £90 from Probationer.

Miss D. Figgins (Minute 667) at a salary of £88 2*s.* per annum, from Temporary Clerk.

L. G. Hemens (Minute 559) at a salary of £82 10*s.* per annum, from Probationer.

C. V. Ockenden (Minute 580) at a salary of £82 10*s.* per annum, from Probationer.

H. T. Smith (Minute 574) at a salary of £82 10*s.* per annum, from Probationer.

R. M. Poulter (Minute 623) at a salary of £82 10*s.* per annum, from Probationer.

Miss H. G. Chivers (Minute 623) at a salary of £75 per annum, from Probationer.

Miss I. Cook (Minute 646) at a salary of £75 per annum, from Probationer.

A. H. Lupton (Minute 630) at a salary of £75 per annum, from Probationer.

Miss F. A. Shields (Minute 623) at a salary of £75 per annum, from Probationer.

Special Increases of Salary were approved as follows, to take effect from 1st April. Salaries quoted are exclusive of such war bonus as may be payable under existing regulations :

Dr. C. Chree, Superintendent at Kew Observatory (Minute 248) from £656 10*s.* 10*d.* to £727 5*s.* 6*d.* per annum. (Consolidated pay £800.)

R. G. K. Lempfert. Superintendent of the Forecast Division (Minute 685) from £600 to £681 16*s.* 4*d.* per annum. (Consolidated pay £750.)

Lt.-Col. E. Gold (Minute 599), upon demobilisation, from a salary of £540 to £681 16*s.* 4*d.* per annum. (Consolidated pay £750.)

F. J. W. Whipple (Minute 599), Superintendent of the Statistical Division, from £540 to £636 7*s.* 4*d.* per annum. (Consolidated pay £700.)

R. Corless (Minute 599), Superintendent of the Instruments Division, from £420 to £477 5*s* 5*d.* per annum. (Consolidated pay £550.)

The following are exclusive of war bonus :—

Miss E. F. Walker (Minute 732), Librarian, from £202 6*s.* 8*d.* to £225 per annum.

A. R. Simpkins (Minute 568), Staff Assistant in the Statistical Division, from £200 to £220 per annum.

A. H. Bell (Minute 568), Staff Assistant in the Statistical Division, from £200 to £220 per annum.

Ordinary Increments were approved as follows, to take effect from 1st April. Salaries quoted are exclusive of such war bonus as may be payable under existing regulations :

Name	From £	*s.*	*d.*	To £	*s.*	*d.*
Dr. A. Crichton Mitchell ...	450	0	0	470	0	0
L. H. G. Dines	320	0	0	335	0	0
E. V. Newnham	265	0	0	280	0	0
H. Jeffreys	265	0	0	280	0	0
E. G. Bilham	265	0	0	280	0	0
C. E. P. Brooks	255	0	0	270	0	0
C. D. Stewart	225	0	0	240	0	0
S. N. Sen	225	0	0	240	0	0
R. A. W. Watt	255	0	0	270	0	0
P. I. Mulholland	225	0	0	235	0	0
Mrs. E. V. Newnham	225	0	0	230	0	0
Miss E. E. Austin	225	0	0	235	0	0
„ L. F. Lewis	225	0	0	235	0	0
„ G. L. Thorman	175	0	0	190	0	0
J. E. Belasco	125	0	0	132	10	0
R. Sargeant	331	5	0	340	12	6
J. Sheerman	255	0	0	262	10	0
W. Hayes	237	10	0	246	17	6
A. T. Bench	218	15	0	228	2	6
H. L. B. Tarrant...	232	10	0	240	0	0
H. Keeton	228	2	6	237	10	0
R. F. Wallace	247	10	0	255	0	0
E. Boxall	232	10	0	240	0	0
E. J. Hood	182	10	0	190	0	0
Miss M. Coleman	186	0	0	193	10	0
F. W. Snell	190	0	0	197	10	0
E. P. Pearce	175	0	0	182	10	0
P. N. Skelton	182	10	0	190	0	0
H. W. Baker	182	10	0	190	0	0
J. H. James	182	10	0	190	0	0

Name.	From £	s.	d.	To £	s.	d.
C. W. Heinemann	147	10	0	150	0	0
J. B. Phillips	132	10	0	140	0	0
A. J. Tabor	82	10	0	90	0	0
B. G. Brame	125	0	0	132	10	0
Miss W. A. Quennell	82	10	0	90	0	0
„ N. L. Despicht	103	2	6	112	10	0
„ M. Bigelstone	75	0	0	82	10	0
„ D. J. Taylor	75	0	0	82	10	0
F. C. Warmington	93	15	0	96	17	6
F. Levin	105	0	0	110	0	0
Miss E. F. Cottrill	90	0	0	97	10	0
„ G. K. Herbert	75	0	0	82	10	0
„ A. J. Clapham	75	0	0	82	10	0
„ R. M. Chambers	82	10	0	90	0	0
„ D. G. Lee	93	15	0	100	0	0
„ W. Bulgin	75	0	0	82	10	0
„ A. L. Sanford	75	0	0	82	10	0
„ E. M. Anderson	85	0	0	92	10	0
W. J. Tomkins	77	16	0	80	6	0
C. E Goad	105	0	0	107	10	0
W. R. Chillman	93	10	0	96	0	0
J. L. Evans	87	10	0	90	0	0

Mrs. Allingham.— *Application for Pension* (Minute 742).—Reported—that a letter (M.O. 1,840) had been sent to the Representative of the Treasury asking whether a grant to Mrs. Allingham was within the regulations and that a reply had been received from Sir Thomas Heath to the effect that under the circumstances the Committee would not be justified in making a grant.

755. Observatories.—**Eskdalemuir.**—Reported—that Dr. Crichton Mitchell would be absent from the Observatory for two months on sick leave, and that Professor W. Peddie had agreed to take charge as Acting-Superintendent for six weeks from 16th March, 1919.

It was agreed that the remuneration should be at the rate of £20 per month.

Wages.—Reported—the following Director's Order for confirmation: Order 800 increasing the wages of the domestic servant at Eskdalemuir Observatory from £26 to £32 per annum as from 1st January with a further increase of £1 per annum on each 1st January till a maximum of £36 per annum is reached.

Approved.

Falmouth.—Reported—that J. B. Phillips had taken temporary charge since the resignation of the Meteorologist-in-Charge on 28th February, 1919 (Minute 154).

756. Publications.—Authority was given for the following publications :—

M.O. 220c. **Geophysical Memoir No. 13.**—Characteristics of the Free Atmosphere by W. H. Dines, F.R.S.

M.O. 220d. **Geophysical Memoir No. 14.**—Soundings with Pilot Balloons in the Isles of Scilly, November and December, 1911, by Captain C. J. P. Cave and J. S. Dines.

Proofs of the following were laid on the table :—

M.O. 232d. **Professional Notes No. 4.**—Upper Air Temperatures at Martlesham Heath, February, 1917, to January, 1918, by Lieut. W. F. Stacey.

M.O. 232e. **Professional Notes No. 5.**—On the use of the normal curve of errors in classifying observations in meteorology, by Capt. E. H. Chapman.

M.O. 232f. **Professional Notes No. 6.**—The variation of Wind Velocity with height, by Capt. E. H. Chapman.

M.O. 223. **Computer's Handbook**, Section V.—Computations related to the theory of probabilities (continuation).

757. DIRECTOR'S REPORT AND ACCOUNTS :—

Reported the following extract from the despatch of the General Officer Commanding-in-Chief of the British Salonica Force, dated 1st December, 1918.

"The Meteorological Section has been of great assistance in a country subject to such sudden changes in the weather, and some valuable records have been obtained."

Reported that various books which had been lent to the Meteorological Office by the Royal Meteorological Society during the War had been returned.

It was agreed that the thanks of the Committee be conveyed to the Royal Meteorological Society for the assistance rendered in lending books and periodicals.

Reported that a Board had been held on unserviceable instruments and stores which had been returned to the Instruments Division Store.

Recommended that 135 articles broken or unfit for use be struck off charge; that 47 be repaired and retained on charge; and that 97 be struck off charge and sold, the proceeds being credited in the accounts of the Office.

Approved.

Recommended that it was desirable to alter the form of the special Daily Weather Report (B Report) so as to include in it the statistical information from the British Isles. It would be described as the British Report. The foreign information would then appear in another, the International Report, which would be published by the following morning or, when reports from abroad arrive by Wireless Telegraphy, the same afternoon.

Information concerning the Upper Air would be given in a separate flysheet.

Copies of these three weather reports were laid before the Committee.

Approved.

Accounts.—Submitted—the following Statement of the Bank Account in the Cash Book :—

	£	s.	d.
Cash balance on 28th January, 1919	3,457	7	2
Receipts from 28th January, 1919	6,684	7	0
	10,141	14	2
Cheques drawn from 29th January, 1919	8,052	9	2
Cash balance on 25th March, 1919	£2,089	5	0